The Dissertation Committee for Scott Larkin Gregoire
certifies that this is the approved version of the following dissertation:

Three Essays Concerning Religion and Domestic Behavior

Committee:

Daniel S. Hamermesh, Supervisor

Maxwell B. Stinchcombe, Supervisor

Jason I. Abrevaya

Christopher G. Ellison

Kripa M. Freitas

Three Essays Concerning Religion and Domestic Behavior

by

Scott Larkin Gregoire, B.S.; M.S.

DISSERTATION

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT AUSTIN

August 2009

to M.I.

Acknowledgments

Thanks must first of all go to Dan Hamermesh and Max Stinchcombe, both of whom were integral to the completion of this dissertation. Dr. Hamermesh freely offered his expertise on empirical research and on the general processes of writing and researching. Dr. Stinchcombe generously gave of his time, spending hours discussing how to model the world and how to interpret those models.

Large tracts of my work deal with matters sociological in nature, I would have navigated these areas much more ineptly without the assistance of Chris Ellison. Though initially he had no idea who I was, he welcomed me to the Sociology Department, and thereafter his door was always open to me. I would also like to thank Jason Abrevaya and Kripa Freitas for their comments and suggestions.

Most importantly, I offer my gratitude to Maritha Indurthy and my parents. I would have lost the hope of ever completing my doctorate long ago if Maritha had not had the confidence in my abilities that I lacked. My parents, Larkin and Nettie, have given their unending support, both financial and emotional, to me in everything that I have undertaken.

Three Essays Concerning Religion and Domestic Behavior

Publication No. _____

Scott Larkin Gregoire, Ph.D.
The University of Texas at Austin, 2009

Supervisors: Daniel S. Hamermesh
Maxwell B. Stinchcombe

In the first essay, I demonstrate that during the 1970s, the marital behavior of US Catholics changed dramatically relative to that of the total population. The Catholic marriage rate, that is, the number of Catholic marriages per 1000 Catholics, decreased nearly 20 percent relative to the civil marriage rate. Before and after this time period, the two rates moved in unison. Empirically, I find that the Catholic reforms and encyclicals of the 1960s, that is, Vatican II and *Humanae Vitae*, led to a decrease in the Catholic marriage rate relative to the civil marriage rate and that the reform of civil divorce law had no effect on this relative rate.

In the second essay, I expand the analysis of the previous essay and test whether a negative response among US Catholics to the reforms of Vatican II and to *Humanae Vitae* is able to explain the increase in the civil marriage rate, the decrease in the Catholic marriage rate, and the increase in the interfaith marriage rate seen in the data. To do this, I construct an original model that treats marriage as a set of two contracts, one civil and one religious, with the benefit and cost of the religious contract depending upon a social complementarity. The theory and the data match if the primary effect of 1960s Catholic reform was to decrease the benefit of a Catholic marriage.

In the third essay, I examine the link between religiosity and the incidence of domestic abuse and model sanctification as the pathway connecting the two. Sanctification is "a psychological process through which aspects of life are perceived by people as having spiritual character or significance"[25]. In the model, the abuser must his choose level of abuse, and both abuser and abused must allocate a scarce amount of time between the production of a marital good and a personal consumption good. Sanctification is modeled as an increase in the return to time invested in the marital good. Theoretically, abuse increases in both spouses' level of sanctification and the wife's productivity and decreases in the husband's productivity. This partially agrees with the data.

Table of Contents

List of Tables

List of Figures

Chapter 1

Introduction

Religious motivations have largely been neglected by economic theorists. When modeling the behavior of individuals, economists look to more 'concrete' and easily quantifiable motivations, such as prices, income, and wealth. Rarely do they model an individual's behavior as dependent upon socials norms or, more specifically, religious norms. Recently, George Akerlof devoted the entirety of his American Economic Association presidential address to this issue, which he refers to as 'the missing motivation'[1]. Akerlof describes how economists generally neglect including social norms as motivating factors in their theoretical work and how the inclusion of these norms would overturn some commonly held theoretical results. Following from Akerlof's criticism, in this dissertation I model domestic behavior as dependent upon personal religious beliefs and religious norms. Specifically, I include religious motivations and norms in the modeling of a single agent's marital decision and of a potentially abusive marriage with the goal of more fully specifying an individual's motivation for action and more accurately predicting his behavior.

Within the last twenty years, economists have begun to use rational choice theory to model and to explain religious behavior. The work of Iannaccone concerning religious human capital[21] and religious groups[22] largely started this trend. This research, though not the first formal model of religious behavior, that credit goes to Azzi and Ehrenberg[3], more thoroughly popularized the idea that economic theory, a theory that is based on the assumption of rational behavior,

could be used to explain a realm of human experience and behavior that is typically thought irrational, that is, the realm of religious experience and behavior. Regretfully, it seems to me that sociologists and religious studies researchers are much more willing to adopt the theory and methodology of economics than are economists to incorporate the findings of sociology into their building of formal models. This relates directly back to Akerlof's criticism mentioned in the previous paragraph.

The efforts of Iannaccone and those following him have gone a long way in explaining religious behavior in economic terms. They have addressed whether a competitive religious environment or a monopolistic religious environment breeds a more religious population[13], why religious groups with more stringent requirements tend to be highly successful[22], and, more ambitiously, the rise of and the eventual dominance of Catholic Church over paganism[38]. What these efforts have largely not done is to incorporate religious motivation into more general economic theories, for example, theories of domestic behavior. I attempt to address this gap by constructing models explaining marital choice and the incidence of domestic violence and including in those models religious motivation and norms along with more typical motivations, such as financial and time considerations.

In Chapter 2, I present data demonstrating the divergence in behavior between the US civil marriage rate and US Catholic marriage rate, the number of Catholic marriages consecrated each year divided by the number of Catholics, that occurred during the 1970s. What makes this curious is that before and after this time period, the two rates moved in unison. No economic theory is able to explain this divergence between the two rates. The most relevant, available theory is that of Matouschek and Rasul[27] or that of Rasul[33]. These two theories treat marriage as a contract, but they are deficient because they treat marriage as a

single contract. How can a model that treats marriage as a *single* contract explain *two* rates, especially when these two rates are behaving differently? Simply put, it cannot. To remedy this deficiency in Chapter 3, I construct a theory that explains marital behavior but, unlike previous theories, it incorporates religious motivations by modeling marriage as a set of *two* contracts, one civil and one religious. This model, though not explicitly based upon the work of Akerlof[2] and Bernheim[5], follows their work in spirit by modeling the entry cost, benefit, and the exit cost of the religious contract of marriage as dependent upon a social complementarity.

Sociologists have demonstrated the influence of religiosity on the incidence of domestic violence, but no economic theory is able to account for this influence since none models religiosity as a factor in an abuser's decision to engage in violence. In fact, there are extremely few theories attempting to explain domestic abuse and, those that do are largely driven by the differences in wealth and income between the two spouses[12, 39]. In Chapter 4, I construct a sequential model of a potentially abusive marriage. In the model, both husband and wife must allocate a scarce amount of time between producing a marital good and a personal consumption good, and the husband (the abuser) chooses a level of violence to direct towards his wife. Violence has two purposes in the model, one is to vent stress (expressive violence) and one is to coerce the wife to behave in a certain manner (instrumental violence). I construct this theory with the aim of explaining both the correlation between income and the incidence of domestic abuse and the correlation between religiosity and domestic abuse.

Thus, in this dissertation I hope to demonstrate the usefulness of including religiosity and religious norms as motivating factors in an individual's decision process. By including these motivations more widely in economic theories, I believe

the predictive ability of these theories would be greatly increased.

Chapter 2

The Divergence of Civil and Catholic Marital Behavior in the United States

2.1 Introduction

In the United States during the mid to late 1970s, the marital behavior of Catholics changed dramatically relative to the marital behavior of the total population. The Catholic marriage rate, that is, the number of Catholic marriages consecrated annually per 1000 Catholics, fell approximately 20 percent relative to the civil marriage rate, that is, the number of civil marriages performed annually per l000 individuals. This relative decrease was the result of an increase of 2 percent in the civil marriage rate and a decrease of 17 percent in the Catholic marriage rate. What makes this curious is that both before and after this period, the two marriage rates moved in tandem. The goal of this essay is to explain the divergence of the Catholic and civil marriage rates in the United States.

I propose two potential causes for this divergence. The first is the reforms in and around the time of the Second Vatican Council, 1962 to 1965. I believe these reforms caused a decrease in both the benefit to and the exit cost of a Catholic marriage. For example, the controversial nature of *Humanae Vitae*, an encyclical that upheld the traditional ban on birth control and abortion, perhaps lessened the benefit of the Catholic institution of marriage; and the reforms of Vatican II decreased the exit cost of a Catholic marriage, that is, the difficulty of getting an annulment. The second is the reform of civil divorce law in the United States. During the 1970s United States divorce law underwent the "no-fault revolution"

in which the majority of states shifted from a fault, mutual consent divorce law regime to a no-fault, unilateral consent divorce law regime, thus lowering the exit costs of a civil marriage. The timing of these reforms suggests a possible connection between the reforms themselves and the divergence in the civil and Catholic marriage rates.

To explore the implications of the proposed causes, I model marriage as a set of two contracts, one civil and one religious. I have chosen to model marriage in this manner because these two contracts have distinct benefits and costs and because entering one contract does not imply that an individual has entered the other. Some examples of the entry costs of the civil contract are scheduling an appointment with and appearing before a justice of the peace and paying a nominal fee; and of the Catholic contract are booking a church, finding a priest, and attending pre-marital counseling. Some examples of the exit costs of a civil contract are bearing the costs of a lawyer and of a potentially unfavorable financial settlement as well as the time lost in divorce proceedings; and of the religious contract are filing a petition of nullity and acquiring a reputational stigma at the divorcees' parish church. Also, I believe that there is a qualitative difference between the benefit and cost of a civil marriage and the benefit and cost of a Catholic marriage; those of a Catholic marriage are more heavily dependent upon the beliefs and actions of the surrounding community. The benefit and cost of a Catholic marriage would be greatly reduced if no one besides those marrying professed to being Catholic.

Given that I am treating marriage as a set of two institutions, or contracts, the question then arises as to why changes in one institution would affect the behavior related to the other institution. What causes the interconnectedness of the two institutions? This interconnectedness arises because a couple is potentially

entering *two* contracts for *one* arrangement, that is, a couple may enter both a civil and Catholic marriage contract simultaneously for a single marriage. A couple makes this choice based upon the relative costs and benefits of each contract. For example, if a change in one institution causes its relative value to increase, then a couple may choose to substitute towards the relatively more valuable institution. More specifically, why would the reform of civil divorce law affect Catholic marital behavior? Imagine that pre-reform a specific couple has decided to marry both civilly and religiously, then the exit cost of a civil marriage contract is lowered while the characteristics of the Catholic contract are held constant. This reform increases the relative value of civil marriage, and this couple may choose to forego the Catholic contract and marry only civilly. If one were to imagine this occurring on a national scale, the Catholic marriage rate would decrease relative to the civil marriage rate after divorce law reform.

I use the model to answer four questions: what is the effect of the shift to unilateral consent on the relative marriage rate[1]? what is the effect of the shift to no-fault divorce on the relative marriage rate? what is the effect of a decrease in the exit cost of a Catholic marriage on the relative marriage rate? and what is the effect of a decrease in the benefit of a Catholic marriage on the relative marriage rate? The model predicts that the shift to unilateral consent will have no effect on the relative marriage rate and that the shift to no-fault divorce will cause a decrease in the relative marriage rate. Catholic reforms potentially had two effects, a decrease in the exit cost of a Catholic marriage and a decrease in the benefit of a Catholic marriage. If the decrease in the exit cost is the dominant effect of the two, then the model predicts that the relative marriage rate will

[1]The ratio of the Catholic marriage rate to the civil marriage rate in any given year is referred to as the "relative marriage rate" throughout this paper.

increase; if the decrease in the benefit is the dominant effect, then the relative marriage rate will decrease.

Empirically, I test whether the divergence between the civil and Catholic marriage rates is correlated with the timing of divorce law reform and Catholic doctrinal reform. I find that neither the shift to no-fault divorce nor the shift to unilateral consent had a statistically significant effect on the ratio of the Catholic marriage rate to the civil marriage rate but that Catholic reforms did cause a decrease in the Catholic marriage rate relative to the civil marriage rate. Thus, I come to three conclusions. The first is that the dominant effect of Catholic reforms was to decrease the benefit of a Catholic marriage, at least relative to the exit cost. The second is that couples choosing between marrying civilly or marrying both civilly and religiously are not significantly affected by changes in the exit cost of either of the two institutions. The third is that the most likely cause of the decrease in the relative marriage rate is the religious reform of the Catholic Church.

To my knowledge, marriage has not been studied formally and empirically as a set of two institutions. Numerous researchers have examined the relationship between civil divorce law and civil divorce rates. Among others, Friedberg[15] and Wolfers[41] have examined this relationship. Two of the very few papers that examine the effect of divorce law reforms on the civil marriage rate are Rasul[33] and Matouschek and Rasul[27]. All of these studies fail to differentiate between the two institutions of marriage, and, as such, they fail to specify fully the motives individuals have for entering or exiting a given marital arrangement. Due to this, they are unable to explain or predict behavior that arises from an individual's choosing between the two institutions of marriage. Therefore, this distinction should be made not only for the sake of clarity and completeness but also to

increase the explanatory power of the theory.

An additional reason for distinguishing between civil and Catholic marriage is that the Catholic marriage rate could be a better proxy for the strength of the social institution of marriage. The ultimate measure of the previous research examining civil marriage and divorce rates is its utility in assessing the strength and the factors affecting the strength of the social institution of marriage. The strength of the institution is directly related to and supported by the strength of the norms that direct individuals to marry and in which manner to marry and those that stigmatize divorce. Those entering into a religious marriage are likely more serious about the commitment they are undertaking than those entering only a civil marriage due to the added severity religion incorporates into marriage and are more strongly guided by social customs and norms. Due to this, the Catholic marriage rate is potentially a better indicator of the strength of the norms supporting marriage and stigmatizing divorce and therefore the strength of the institution of marriage. Lastly, examining the interaction of the civil institution and the religious institution of marriage can help one generally to understand better how legal and social institutions interact and affect one another. For example, researchers can better understand when the two types of institutions are complements and when they are substitutes. These types of interactions should be better understood to ensure stable social institutions with the aim of increasing overall social welfare.

I contribute to the theoretical literature with my novel recasting of marriage as a set of two contracts and my study of the interaction between these two contracts. I know of no other papers that formally consider marriage as a 'dual' contract. In fact, even formally considering marriage as a contract is relatively new to the economics literature. Moreover, I contribute to the empirical literature by

studying the effect of lowering the cost of civil divorce and of Catholic annulment and of increasing the benefit of Catholic marriage on both the civil and Catholic marriage rates simultaneously, as opposed to focusing solely on civil reform and its effect on the civil marriage rate.

2.2 Potential Explanations

During the 1960s, the doctrine of the Catholic Church was reexamined in detail and updated to 'modern' standards as the Church saw fit. This process may have decreased the benefit of a Catholic marriage. On the one hand, to some Catholics the reforms of Vatican II might have seemed to abandon Catholic orthodoxy and to cause the Church to become less differentiated from other religions. If the Church had become less distinct from other religions and secular society, the value of marrying in the Church would have decreased as well because there would be a less distinct benefit to entering the Catholic institution. On the other hand, the upholding of traditional doctrine, for example, *Humanae Vitae*, might have lessened more progressive individuals' support of the Church. Hout and Greeley[20] present evidence that after *Humanae Vitae*, church attendance among Catholics dropped dramatically until 1975 due to the Church's upholding of traditional doctrine regarding sexual morality, specifically, its continued ban on artificial birth control. No other major religion has seen a decline in church attendance over the last century. Though church attendance dropped, very few Catholics actually left the Church; they merely reduced their participation in church services. For example, a Catholic who once attended mass on a weekly basis might now only attend on a monthly basis, but he or she would still choose to remain a Catholic. The act of reformation undertaken by the Catholic Church during the 1960s seems to have upset both traditionalist and progressive Catholics,

Table 2.1: CARA Survey Responses

	Pre-Vatican II	Vatican II	Post-Vatican II
Ever Divorced	11	21	7
Divorce is usually best solution when a couple can't seem to work out their marriage problems	27*	34	26
Marriage is a lifelong commitment	73**	56	67
Marriage is a calling from God	43**	23	28
Marriage is a vocation	44**	20	24

Notes: Source: CARA Survey (2007). Each number is the percentage of those respondents from each generation responding. *Percentage who agree "somewhat" or "strongly." **Percentage who say this statement is "very consistent with my views."

testing their faith in and devotion to the Church.

The decrease in the benefit of Catholic marriage that occurred during and after 1960s Catholic reform is evidenced by a survey conducted in 2007 by the Center for Applied Research in the Apostolate (CARA). This survey questioned Catholics regarding the sacrament of Holy Matrimony. Those surveyed included members of the Pre-Vatican II Generation (aged 65 and over), Vatican II Generation (aged 47 to 64), and Post-Vatican II Generation (aged 26 to 46). Generally, "members of this generation [Vatican II] are more likely than the generations before them to emphasize concerns of individual self-actualization over institutional commitment" (p. 14). The children of the Vatican II Generation "grew up at a time when divorce rates rose rapidly (among the Vatican II Generation) and seemingly intractable socio-economic problems grew. This 'survivor' generation is relatively less likely to make long-term commitments" (p. 14). Thus, the generations following the reforms of Vatican II seem to benefit from the institution of marriage less than those before Vatican II. The Vatican II Generation seems

to benefit from Catholic marriage less than even the Post-Vatican II generation. They are less likely to believe marriage is a life-long commitment and more likely to believe divorce is the best solution when a couple's marital problems seem unsolvable. Apropos the sacredness of the institution, the Vatican II Generation is less likely to believe that marriage is a vocation or a calling from God. (see Table 2.1) Thus, the benefit of a Catholic marriage in the eyes of many Catholics seems to have fallen after Vatican II with the most dramatic decrease immediately following the religious council.

This process of reform also decreased the exit cost of a Catholic marriage since annulments were afterwards more easily obtained. The primary purpose of Catholic marriage was changed so as to equate "the good of the spouses" and "the procreation and education of children" in importance[40]. Before this time, the primary purpose was "the procreation and education of children." This change allowed more petitions of nullity to be approved. Empirical evidence of the increased ease of obtaining an annulment is that during the 1970s the number of annulments granted in the United States increased six-fold[40].

In the "no-fault revolution" of the 1970s, divorce law was reformed in two ways: fault-based divorce was changed to no-fault-based and mutual consent divorce was changed to unilateral consent. The first type of reform eliminated both the prerequisite of finding marital fault for the dissolution of a marriage and the use of marital fault as a consideration in financial settlement. In the literature, this reform is accepted as decreasing the exit cost of a civil marriage. The second type of reform eliminated the requirement that both spouses consent for a marriage to be dissolved and instead required the consent of only one spouse. As is typical in the literature following Becker et al.[4], I consider this reform as a reassignment of the right to divorce within a marriage. Under the mutual consent regime, the

spouse who desires to remain married holds the right to divorce because he or she is the determining factor in whether the couple divorces; under the unilateral consent regime, the situation is reversed and the spouse who desires to divorce holds the right because he or she is now the determining factor. According to the Coase Theorem, this initial allocation of rights, in this case, the right to divorce, does not affect the outcome of the bargaining problem because as long as the utility surplus of remaining married over the spouses' being single is positive, then this surplus can be distributed so as to keep the marriage intact irrelevant of who holds the right to divorce. Therefore, I expect that the shift from mutual consent to unilateral consent would not affect the incidence of divorce, either civil or Catholic. As such, in my model I focus on the shift to no-fault divorce.

In addition to these two causes, one might suspect a demographic shift or the social changes of the 1960s as a cause of the relative change in Catholic marital behavior. For a demographic shift to be a plausible explanation for the divergence of marriage rates, the shift must be a *relative* shift in the Catholic population. For example, if the age distributions of the US Catholic population and the total US population are very similar and both become younger over time, that might explain an increase or decrease in the marriage rates but that would not explain a divergence between the two marriage rates. Until the late 1980s, the two age distributions were probably very similar, leading me to conclude a demographic shift is not in fact a reasonable explanation.[2] To attempt to control for any nationwide social changes occurring during this time period, I include year

[2]I thank Paul Perl at CARA for this information. He adds one caveat saying that within the last 10 to 20 years the age distribution of Catholics has most likely become younger than the general population because of the growing number of Hispanic Catholics in the United States.

fixed effects. These fixed effects should control for any covariates that are time-dependent but state-independent. In this manner, I can focus on specific reforms and their consequences while controlling for social change.

2.3 Secular and Catholic Marital Law

When one refers to US divorce law reform, one is actually referring to two legal changes, the first is a change from "fault" to "no-fault" divorce and the second is a change from "mutual consent" to "unilateral consent" divorce. The definitions of "fault" and "consent" can become quite convoluted considering that numerous researchers have defined their own codifications of the timing of these reforms. Especially in regard to no-fault reform, these codifications vary significantly because fault enters civil divorce proceedings in two ways, as grounds for dissolution of a marriage and as a consideration in division of financial assets after a marriage has been dissolved. Under "fault" divorce, one spouse has to be found guilty of an offence against the other spouse for there to be grounds for divorce; also, this "fault" is given due accord when determining alimony, child custody, and general division of assets. "Mutual consent" divorce requires the consent of both spouses to dissolve a marriage, and "unilateral" divorce requires the consent of only one spouse. "Unilateral" divorce itself comes in at least two varieties, with and without separation requirements. For example, if there is a two-year separation requirement, then, in addition to the consent of one spouse, the couple must live in different households for two years before a divorce can legally be granted.

There are several codifications in the law and economics, economics, and sociology literature. For the shift to no-fault divorce, these are Nakonezny et

al.[29], Brinig and Buckley[6], Ellman and Lohr[11], and Gruber[19]. Nakonezny and his co-authors, who are psychologists, code legal reforms based upon both primary and secondary sources, though mostly secondary sources, and seem to imply that what they mean by "no-fault" is that no spouse needs to be found guilty of marital fault for there to be legal grounds for the dissolution of a marriage and also that fault is not a consideration in financial settlement of a divorce. Brinig and Buckley, who are lawyers, construct their coding from primary sources and explicitly state that "no-fault" divorce for them means that there are no-fault grounds for the dissolution of a marriage and fault is not a consideration in financial settlement. Their coding differs significantly from that of Nakonezny et al. Ellman and Lohr, a lawyer and statistician respectively, have numerous codings based on whether fault is required for the dissolution of a marriage or is a consideration in financial settlement; these codings are based on both primary and secondary sources. Their coding that captures the shift to "no-fault" financial settlement is quite similar to that of Brinig and Buckley. For the shift to unilateral divorce, the most common codings are Friedberg[15] and Gruber[19]. These authors, both of whom are economists, use the same definition of "unilateral" divorce and have similar codings. Gruber states that his coding is a reexamination and updating of Friedberg's.

Ellman and Lohr[11] is my preferred coding for no-fault reform dates (see Table 2.2), and Friedberg[15] is my preferred coding for unilateral reform dates (see Table 2.3). Ellman and Lohr's coding is chosen for three reasons. The first is that they are very clear as to what their definition of "no-fault" is. Secondly, they have a coding for the specific type of no-fault divorce in which I am interested in studying. The strongest form of "no-fault" and the one that I believe is most likely to affect behavior is the form in which there are no-fault grounds

Table 2.2: No-Fault Reform Dates

State	Ellman and Lohr			State	Ellman and Lohr		
	Separation	Irretrievable Breakdown	Property Division		Separation	Irretrievable Breakdown	Property Division
AL		1971		MT		1975	1975
AK	1935	1974	1974	NE		1972	1972
AZ		1973	1973	NV		1931	?
AR	1937	1979	1979	NH	1971		
CA		1969	1969	NJ	1971		1980
CO		1971	1971	NM	1973		1976
CT		1973		NY	1966		
DE	1970	1974	1974	NC	1931		
FL		1971	1986	ND		1971	
GA		1973		OH		1974	
HI		1972	1960	OK	1953		1975
ID		1971	1990	OR		1971	1971
IL		1983	1977	PA		1980	
IN		1973	1973	RI		1975	
IA		1970	1972	SC	1969		
KS	1969		1990	SD		1985	
KY		1972		TN		1977	
LA	1965			TX	1925	1969	
ME		1973	1985	UT	1953	1987	1987
MD	1937			VT	1941		
MA	1975			VA	1960		
MI		1971		WA		1973	1973
MN		1974	1974	WV		1977	
MS		1976		WI	1969	1977	1977
MO		1973		WY		1977	

Table 2.3: Unilateral Reform Dates

State	Friedberg	Gruber	State	Friedberg	Gruber
AL	1971	1971	MT	1975	1973
AK	pre-1968	1935	NE	1972	1972
AZ	1973	1973	NV	1973	1967
AR			NH	1971	1971
CA	1970	1970	NJ		
CO	1971	1972	NM	1973	1933
CT	1973	1973	NY		
DE		1968	NC		
FL	1971	1971	ND	1971	1971
GA	1973	1973	OH		
HI	1973	1972	OK	pre-1968	1953
ID	1971	1971	OR	1973	1971
IL			PA		
IN	1973	1973	RI	1976	1975
IA	1970	1970	SC		
KS	1969	1969	SD	1985	1985
KY	1972	1972	TN		
LA			TX	1974	1970
ME	1973	1973	UT		1987
MD			VT		
MA	1975	1975	VA		
MI	1972	1972	WA	1973	1973
MN	1974	1974	WV		
MS			WI		
MO			WY	1977	

for divorce and fault is not a consideration in financial settlement. Ellman and Lohr's coding for this type of "no-fault" is a revision of that of Brining and Buckley[6] and therefore seems to be the slightly more accurate. Lastly, Ellman is a trained lawyer, and thus his work is more likely to be accurate than the work of a non-lawyer. For unilateral reform, I choose Friedberg's coding mainly because Wolfers[41] does. Since there are not significant differences between Friedberg and Gruber[19], this choice does not significantly alter my results. Additionally, as Wolfers does, I replace Friedberg's coded reform year for Alaska and Oklahoma with that of Gruber because Friedberg does not code specific dates for these two states, only that these reforms occurred before her sample period, that is, before 1968.

When one speaks of Catholic marriage, it is important to distinguish between divorce and annulment. By divorce, one means a dissolution of an existing marriage. By annulment, one means an official declaration that states the said marriage was never valid. Therefore, a marriage is not dissolved by an annulment; it is declared to have never existed. The Catholic Church does not recognize any form of divorce, only annulment. If a Catholic marriage is valid, it is eternal, and there is no way for it to be dissolved. The only way to exit a Catholic marriage is for it to be anulled. This could be declared for procedural reasons, perhaps the ceremony was not performed in the correct manner, or for psychological or emotional reasons, such as one or both of the two parties being unable to consent free of coercion. When one desires to have his marriage annulled, he files a petition of nullity with his local Catholic tribunal. The process following the filing of the petition is similar to that that takes place in a secular court of law. An important consequence of not receiving an annulment is that a divorced Catholic is unable to remarry within the Catholic Church.

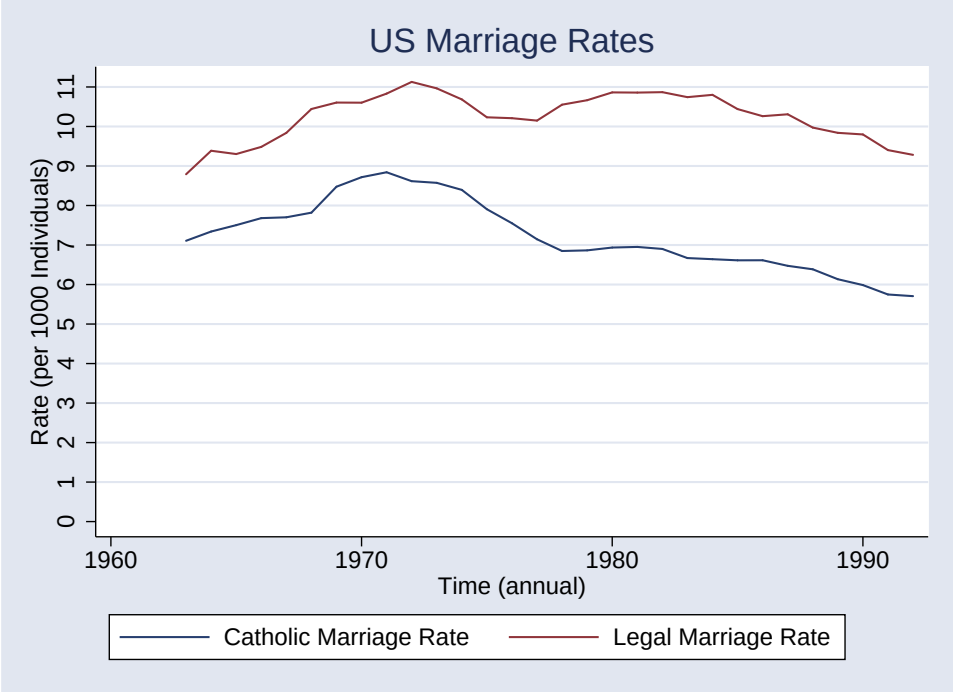

Figure 2.1: National Marriage Rates

2.4 National Data

I examine time series of the US Catholic population level, the US Catholic marriage level, the US population level, and the US civil marriage level at the national level. All time series run from 1963-1993. The US Catholic population and the number of US Catholic marriages are from the Official Catholic Directory (OCD). The OCD presents the official statistics for the Catholic Church in the United States annually. The US population is from the US Census Bureau, and the number of US civil marriages is from the National Vital Statistics report of the Center for Disease Control and Prevention.

Figure 2.1 shows the US civil marriage rate, that is, the number of civil marriages performed annually per 1000 individuals, and the US Catholic marriage rate, that is, the number of Catholic marriages consecrated annually per 1000

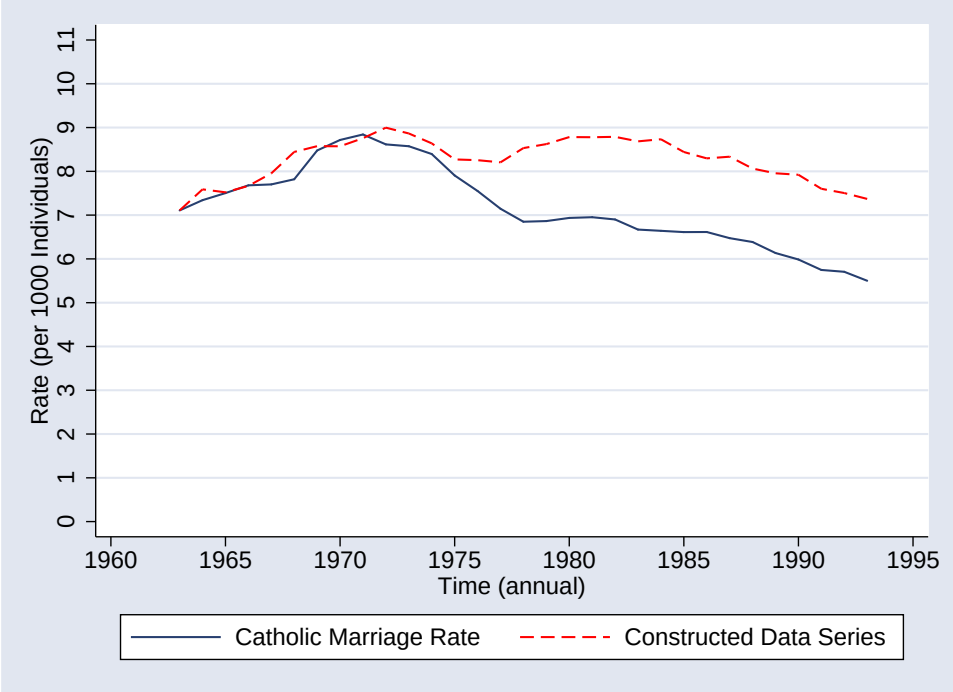

Figure 2.2: Catholic Marriage Per Capita Catholic

Catholic, for 1963 to 1993. From 1963 to 1971, the Catholic marriage rate trends upward, increasing 19 percent. In 1971 the trend reverses and the rate decreases 21 percent during the 1970s. During the 1980s the trend continues downward but more slowly, decreasing 12 percent. Initially, the civil marriage rate behaves similarly, trending upward and reversing trend in 1972. Then in 1975 it deviates from the Catholic rate, and in 1977 the civil rate begins to increase and diverges completely from the Catholic rate. Finally, in 1982 the civil marriage begins to decrease, and the two rates once again follow a similar trend, though they do so with a larger distance separating them.

Until 1975, the similarity in behavior of the two marriage rates is striking; equally striking is their divergence in behavior after 1975. Figure 2.2 more clearly demonstrates these differences in behavior. The solid line is the Catholic marriage

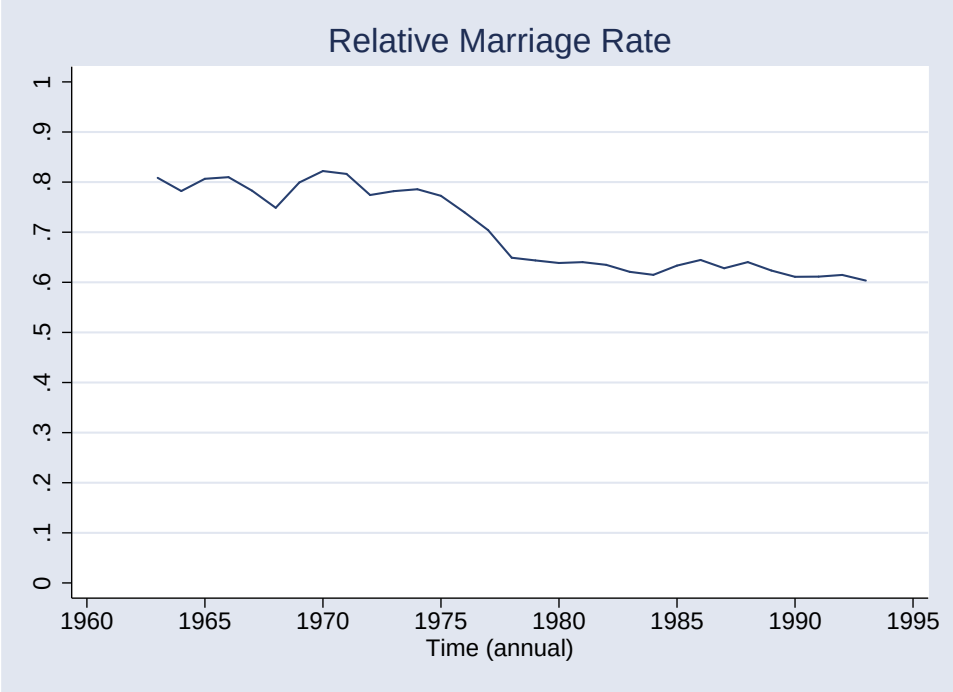

Figure 2.3: Catholic Marriages as Percentage of Total US Marriages

rate; the dashed line is what the Catholic marriage would have been had it grown at the same rate as the civil rate. To construct the dashed line, I started with the number of Catholic marriages in 1963 and grew this series at the same rate as the number of civil marriages, then divided the series by the US Catholic population. One can see that the two series behave similarly until the mid 1970's then diverge until the early 1980's when they both follow the same trend. It is as if before 1975 both rates were in equilibrium, then there was a shift in the environment. Around 1982 once again the two rates settled into an new equilibrium relative to one another, albeit an equilibrium in which there was a larger difference between the two rates. I believe this "shift in the environment" to be either the reform of civil divorce law or the reforms surrounding Vatican II.

Figure 2.3 shows the relative marriage rate, that is, the Catholic marriage

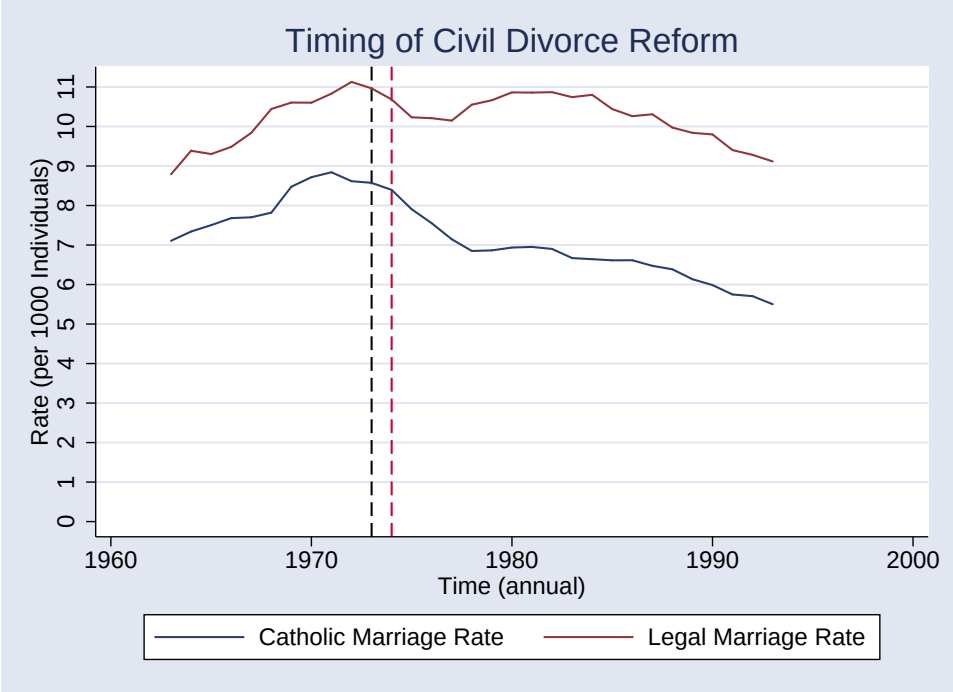

Figure 2.4: Timing of Legal Reforms

rate divided by the civil marriage rate. Between 1971 and 1979, this statistic decreased 22 percent from $\approx .82$ to $\approx .64$. Again one can see that in the mid to late 1970's the marital behavior of Catholics changed drastically relative to the total population. This behavioral change is not due to a change in the relative size of the US Catholic population; the US Catholic population relative to the total US population stays fairly constant over this 30 year period, ≈ 24 percent of the total US population.

Under the Ellman and Lohr[11] coding, 24 states had no-fault divorce laws in place as of 1998. Of these 24, 17 changed their laws between 1969 and 1979. Under the Friedberg[15] coding, 31 states had unilateral divorce laws in place, and 28 reformed their laws between 1969 and 1977. The year the median state changed to unilateral divorce is 1973; the year the median state changed to no-

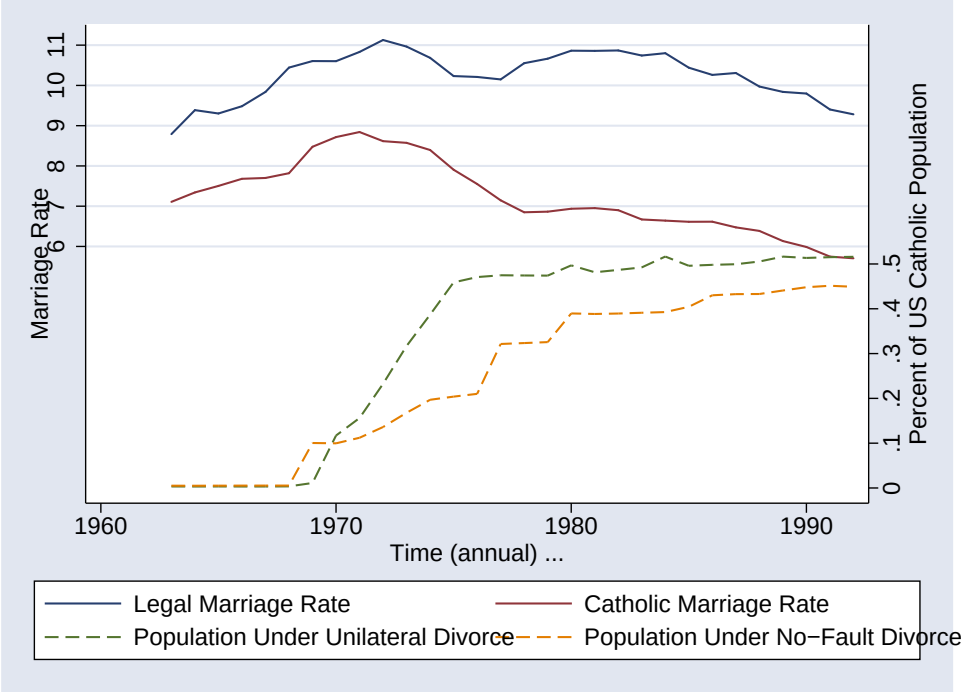

Figure 2.5: Catholic Population under Reformed Law

fault divorce is 1974. As Figure 2.4 shows, these legal reforms occurred in a similar time frame as the divergence in the two marriage rates. The dashed line on the left is the year the median state instituted unilateral reform and on the right the year the median state instituted no-fault reform. Both of these median reforms occur before and near the divergence of the two marriage rates.

Additionally, when these two rates begin to behave differently, a significant portion of the population lived in a state with reformed laws in place. In Figure 2.5, the upper green dashed line is the percentage of the US Catholic population that was living under unilateral divorce, and the dashed orange line is the percentage living under no-fault divorce. At the time of the divergence in marital behavior, half of the population of Catholics was living under unilateral divorce and nearly a third under no-fault divorce. According to other, less stringent def-

initions of no-fault divorce, nearly 90 percent of the population was living under no-fault divorce at this time.

The Second Vatican Council occurred between 1962 and 1965. *Humanae Vitae*, the encyclical that upheld the traditional Catholic teachings regarding sexual morality, was released in 1968. Both of these occurred near the divergence of the two marriage rates. They occurred slightly earlier than the reform of divorce law, and therefore had a longer window of time between them and the decrease in the relative marriage rate. This is not troublesome though, since social reform would be expected to take longer to become effective than legal reform. These reforms applied on a national level, and therefore all US Catholics were potentially affected by them. Both the timing of legal and religious reforms and the proportion of the population living under them suggest that they were able to have a significant effect on marriage rates.

The fact that there was a delay of 7 to 10 years between the reform of Catholic doctrine and the change in marital behavior of both Catholics and the general populus may seem a concern, but this span of time was necessary for adolescent Catholics in their pre-teenage and early teenage years to acquire a negative evaluative preference of the Catholic institution of marriage and therefore choose not to marry religiously. I believe adolescent Catholics adopted this negative preference because they came to associate increased conflict with Catholic marriage. The increased conflict that these youths were observing was due to the mixed reaction of the Catholic community to Vatican II and *Humanae Vitae*.

It has been shown that the quality of a marriage is positively correlated with the similarity of attitudes towards marriage between parent and child[7]. If a child's parents are involved in a high quality marriage, the child forms a positive evaluative preference of the parents' specific type of marital union. When the child

enters into a relationship and decides what type of marital union to enter, he will choose to follow the example of his parents and to enter into a type of marital union similar to theirs. In the opposite scenario, the child comes to disapprove of his parents' relationship and rejects their specific type of marital union. Thus, what a child observes in his parents' relationship strongly influences the relationship decisions that he makes in early adulthood. Church attendance and religious devotion are associated with greater marital happiness and a lower risk of conflict within a marriage[35]. Given this correlation and the fact that between 1968 and 1975 church attendance decreased by one-third among Catholics alone and no other major religious group[20], this potentially points to an increase in marital conflict and a decrease in marital happiness among Catholics. Another piece of evidence that suggests an increase in discord in Catholic communities is that after Vatican II and *Humanae Vitae*, the percentage of a state's population that is Catholic was negatively correlated with the Catholic marriage rate; whereas, before Vatican II and *Humanae Vitae*, this correlation was positive. Seeing this increase in discord, children of the Vatican II generation would adopt an attitude toward Catholic marriage dissimilar to their parents, that is, they would choose not to enter into a Catholic marriage.

To understand better the above process and why it might have taken nearly a decade to influence the marital attitudes of adolescents, I turn to the social psychology literature on attitude formation.[3] Social psychologists predominantly treat attitudes as learned predispositions[8]. One of the dominant theories of attitude formation, especially with regard to the evaluative nature of attitudes, is

[3]In addition to cited sources, this paragraph is based upon the articles on attitude formation, attitude change, and classical conditioning in *The Blackwell Encyclopedia of Social Psychology*[26].

classical conditioning[36, 37]. The gist of this theory is that an unconditioned stimulus, that is, a stimulus that is inherently pleasing or displeasing, becomes associated with a conditioned stimulus, that is, a stimulus that has no inherent pleasure value. Thus, the conditioned stimulus comes to elicit the same response, either pleasing or displeasing, as the unconditioned stimulus. In this specific instance, stress and conflict, the unconditioned stimuli, become associated with Catholic marriage, the conditioned stimulus, in the eyes of adolescents living in Catholic households; and thus the adolescents come to think negatively of Catholic marriage. This conditioning process is not immediate and requires repeated exposure to the pair of unconditioned and conditioned stimuli to become reinforced in the subject. The 7 to 10 year lag between Catholic reform and the change in marital behavior can be explained as the length of time necessary to form a negative evaluative preference of Catholic marriage in pre-marital adolescents and to reinforce these preferences.

2.5 Theoretical Implications

The model presented here is a modified version of Matouschek and Rasul[27]. In this model, I focus on the changes in marital behavior that are responses to the decrease in the exit cost of civil marriage, the decrease in the exit cost of religious marriage, and the decrease in the benefit of religious marriage. The decrease in the exit cost of the civil divorce is meant to capture the shift to no-fault divorce. I abstract from marital bargaining and the shift to unilateral consent due to the implications of the Coase Theorem. Hence I ask of the model, what is the response of the religious marriage rate relative to the civil marriage rate to the decrease in the exit cost of civil marriage, what is its response to the

decrease in the exit cost of religious marriage, and what is its response to the decrease in the benefit of religious marriage?

In the model, there are two forms of marriage from which to choose, an agent can marry civilly or an agent can marry both civilly and religiously. The per period benefit to a civil marriage is a relationship-specific benefit b that is drawn when a couple first meets, and the per period benefit $B > 0$ to a religious marriage is exogenous and is the same for all religiously married couples. The benefit $b \in [0, \infty)$ is drawn from the distribution $H(\cdot)$. The exit cost of a civil marriage is normalized to 0, and the exit cost of a religious marriage is $\gamma > 0$. One can think of γ as the cost of exiting a religious marriage relative to a civil marriage. This cost is the same for all religiously married couples.

There is a unit mass of single agents with .5 men and .5 women. Initially, each man meets a women with certainty, and they draw a b. Given this b, they decide whether they will marry civilly or both civilly and religiously. Next period, each couple receives their relevant per-period benefit and draws an outside option σ that can be realized by both spouses if the marriage is dissolved. $\sigma \in [0, \infty)$ is drawn from $F(\cdot)$. If the marriage is dissolved, they must pay the exit cost of their relationship upfront and in full; and next period the two former spouses both receive σ. After exiting a marriage, the game ends for the divorcees. If they choose to remain married, then they enter the next period, receive their per-period benefit and draw a new σ, and once again decide whether to remain married.

If the couple chooses to marry only civilly, then the value function of a specific spouse is

$$V_c = b + \int_0^{\beta V_c} \beta V_c dF(\sigma) + \int_{\beta V_c}^{\infty} s dF(\sigma). \tag{2.1}$$

Each spouse receives b. If today's σ is smaller than the discounted value of re-

maining married, that is, βV_c, then tomorrow the spouses once again receive the benefit of being married civilly and draw a new σ. If σ is larger than βV_c, then tomorrow each spouse receives the σ and exits the game. If the couple marries both civilly and religiously, then the value function becomes

$$V_r = B + b + \int_0^{\beta V_r + \gamma} \beta V_r dF(\sigma) + \int_{\beta V_r + \gamma}^{\infty} (s - \gamma) dF(\sigma). \tag{2.2}$$

Today each spouse receives the relationship-specific b and the exogenous benefit B. If σ is less than the discounted value of remaining both civilly and religiously married plus the exit cost of the relationship, that is, $\beta V_r + \gamma$, then the couple remains engaged in both contracts and continues to tomorrow. If σ is greater than the sum of βV_r and γ, then the marriage is dissolved, both spouses pay γ immediately, receive σ tomorrow and then exit the game.

Matouschek and Rasul[27] demonstrate that there exists a $\overline{b}$ such that all couples that draw $b \geq \overline{b}$ marry both civilly and religiously and all couples that draw $b \leq \overline{b}$ marry only civilly. Therefore, the proportion of couples that marry that enter both contracts is $1 - H(\overline{b})$, and the rate of religious marriage is $[1 - H(\overline{b})]\frac{1}{2}$. Since all couples marry civilly in the model, the civil marriage rate is .5.

If the cost of civil divorce is lowered, this implies that the relative cost of exiting a religious marriage has increased, that is, γ has increased. Given this increase, I would like to examine what happens to the relative marriage rate in the model. To answer this question, one must know the value of $\dfrac{d\overline{b}}{d\gamma}$. By implicitly differentiating equations (2.1) and (2.2), one finds that $\dfrac{d\overline{b}}{d\gamma} > 0$. This implies that given an decrease in the cost of civil divorce and thus an increase in the relative exit cost of religious marriage, the relative marriage rate decreases. In contrast to this, if the cost of an annulment is decreased, the relative cost of exiting a religious marriage has decreased, that is, γ decreases. This leads to an increase in

the relative marriage rate. If the benefit of religious marriage is decreased, that is, if B is decreased in the model, what happens to the relative marriage rate? To answer this question one must know the value of $\frac{d\bar{b}}{dB}$. By once again implicitly differentiating equations (2.1) and (2.2), one finds that $\frac{d\bar{b}}{dB} < 0$. Thus, a decrease in B leads to a decrease in the relative marriage rate. The model predicts a decrease in the relative marriage rate as a consequence of a decrease in the exit cost of a civil marriage. If the dominant effect of religious reform is to decrease the exit cost of a religious marriage, then the model predicts an increase in the relative marriage rate; if the dominant effect is to decrease the benefit, the model predicts a decrease in the relative marriage rate.

2.6 Empirical Implications

I test whether the relative marriage rate is correlated with civil divorce law and Catholic reforms. The theory predicts

- the shift to unilateral consent will have no effect on the relative marriage rate,
- the shift to no-fault will cause a decrease in the relative marriage rate,
- if the dominant effect of Catholic reforms is to decrease in the exit cost of Catholic marriage, the relative marriage rate will increase, and
- if the dominant effect is to decrease in the benefit, the relative marriage rate will decrease.

I perform these tests using a state-level panel of the Catholic marriage rate and of the civil marriage rate. This panel is balanced and covers 49 states from 1960 to

1992. Ellman and Lohr[11] do not list a no-fault reform data for Nevada so I do not include it in any of the regressions to make my results more easily comparable across different regressions. These data were obtained from the Official Catholic Directory and from the Centers for Disease Control, respectively. Also, recall from above that my preferred legal codings are the most restrictive of Friedberg[15] for the shift to unilateral divorce and the most restrictive of Ellman and Lohr[11] for the shift to no-fault divorce.

To estimate the relationship between the relative marriage rate and both legal and religious reform, I use the following as my baseline specification:

$$relrate_{s,t} = \alpha_s + \gamma_t + \beta^v Vatican_t + \beta^u Unilateral_{s,t} + \beta^n Nofault_{s,t} + \epsilon_{s,t} \quad (2.3)$$

α is a state fixed effect, and γ is a year fixed effect. $relrate$ is the relative marriage rate. *Unilateral* is an indicator variable that is 1 in the year of unilateral reform and afterwards, and it is 0 otherwise; *Nofault* is an indicator variable that is 1 if a no-fault divorce law regime is in place and 0 otherwise. *Vatican* is an indicator variable that is 1 in 1965, the final year of Vatican II, and afterwards; otherwise, it is 0.[4] This equation is sufficiently general so as to eliminate the need to add all relevant covariates that are time-independent within each state and that are time-dependent but state-independent. An obvious deficiency is the lack of any covariates that are both state- and time-dependent. I will address this concern below by including time trends for each state.

My main results are presented in Table 2.4. In my baseline specification, column (3), both the coefficient on *Unilateral* and the coefficient on *No-Fault* are positive and insignificant. The coefficient on *Vatican* is negative and strongly

[4]We also substitute for the *Vatican* indicator, an indicator that is 1 in 1968 and afterwards, and 0 otherwise. *Humanae Vitae* came into effect in 1968. Our results are not affected.

Table 2.4: Main Estimation Results

	Dependent variable: Relative Marriage Rate				
	(1)	(2)	(3)	(4)	(5)
Unilateral	.010 (.034)	-	.010 (.034)	.018 (.029)	.017 (.031)
No-Fault	.033 (.032)	-	.033 (.032)	.029 (.027)	.029 (.031)
Vatican	-	-.281 (.033)**	-.302 (.042)**	-.070 (.030)*	-.227 (.049)**
%Cath	-	-	-	-	.172 (.141)
%Cath*Vatican	-	-	-	-	-.408 (.131)**
Year Effects	Yes	Yes	Yes	Yes	Yes
State Effects	Yes	Yes	Yes	Yes	Yes
State trend, linear	No	No	No	Yes	No
Adjusted R^2	.738	.736	.738	.825	.756
Obs	1615	1615	1615	1615	1615

Notes: Sample covers 49 states (NV is dropped) from 1960 to 1992. Standard errors are in parentheses. All standard errors are robust and adjusted for clustering. ** significant at 1 percent level. * significant at 5 percent level.

significant. To attempt to control for time-changing covariates that vary across states, I add a linear, state-specific time trend. The addition of this trend does not affect the coefficient on *Unilateral* or on *No-Fault*; with the linear trend, the coefficient on *Vatican* rises from -.302 to -.07. The fact that the inclusion of time trends decreases the explanatory power of *Vatican* coefficient is not surprising since the effects of the reform of Catholic doctrine would most likely show up as a decreasing propensity to marry religiously in any given state.

These results imply that the dominant effect of Catholic reform on a couple's marital decision is to decrease their prospective benefit to entering into the Catholic institution. Additionally, recall that the theory predicted a negative response to the shift to no-fault divorce, but, empirically, this effect is not seen. Thus, my results imply that changes in the exit cost of either the civil or Catholic institution of marriage did not significantly effect the decision of those couples choosing between them.

A shortcoming of *Vatican* is that it does not depend upon both state and time, only upon time. Thus, I would like to find an additional variable that captures the implementation of Catholic reforms but varies across both state and time. It seems reasonable to assume that the benefit of Catholic marriage is dependent upon the concentration of believers in that institution. To remedy this shortcoming, I construct a variable that interacts the implementation of Catholic reforms with the percentage of a state's population that is Catholic. This interaction variable varies across state and time. The results from the inclusion of this variable are presented in Table 2.4, column (5). Before Vatican II, the percentage of a state's population that was Catholic had a positive but insignificant effect upon the relative marriage rate. This result is interesting in and of itself. But if one looks to the coefficient on the interaction term, one sees that it is significant and negative. In fact, it is so negative that after Vatican II, the more densely occupied an area is by Catholics, the less likely are those Catholics to enter into the Catholic institution of marriage. After Catholic reform, the total effect of *%Cath* is -.235, and its standard error is .053.

I substitute every no-fault default coding mentioned above for my preferred codings. These results are presented in Table 2.5. The only aberration is that the coding of the Nakonezny et al.[29] produces a significant and negative coefficient, but the validity of this coding has been seriously questioned by legal scholars[11].

2.7 Conclusion

I have presented data demonstrating the divergence in marital behavior between the Catholic and civil population in the 1970s, and I have proposed and modeled two possible explanations of this divergence, one based upon legal reforms

Table 2.5: Results Using Alternative Codings for No-Fault Reform

	Dependent variable: Relative Marriage Rate					
	(1)	(2)	(3)	(4)	(5)	(6)
Unilateral	.017 (.035)	.009 (.039)	.045 (.038)	.015 (.036)	.014 (.033)	.010 (.034)
Brinig and Buckley	-.009 (.040)	–	–	–	–	–
Gruber	–	.001 (.032)	–	–	–	–
Nakonezny	–	–	-.069 (.034)*	–	–	–
Ellman and Lohr						
Seperation	–	–	–	-.030 (.045)	–	–
Irretrievable						
Breakdown	–	–	–	–	.002 (.032)	–
Property Division	–	–	–	–	–	.033 (.032)
Adjusted R^2	.737	.728	.741	.737	.736	.738
Obs	1615	1549	1615	1615	1615	1615

See Notes for Table 2.4. All regressions include State and Year Fixed Effects and a dummy for Vatican II reforms.

and one based upon religious reforms. Empirically, I find that the divergence in marital behavior was caused by the reforms and proclamations of the Catholic Church during the 1960s, including both Vatican II and *Humanae Vitae*. These caused a decrease in the benefit to engaging in a Catholic marriage, thus causing a shift from Catholic marriage to civil marriage.

In the simple theory presented in this essay, agents choose between marrying civilly or both civilly and religiously simultaneously by a comparison of the relative value of the two institutions of marriage. This theory is the first step in the construction of a more complete model that can fully explain marital behavior. I build upon the previous economics literature modeling marriage, for example, Rasul[33] and Matouschek and Rasul[27], and formally reimagine marriage as a set of *two* contracts that a marrying couple can enter simultaneously. This modification is essential in understanding and predicting the behavior of individuals marrying due to the fact that individuals are motivated by religious and

social costs and benefits in addition to financial and legal costs and benefits when choosing if, how, and when to enter a marriage.

This theory is able to explain the changes in marital behavior that are responses to changes in the benefit of the two marital institutions but not those that are responses to changes in their exit cost. The model predicts that agents respond to changes in the exit cost of both institutions of marriage, but I find no empirical evidence that this is the case. For example, empirically the shift to no-fault reform does not significantly affect the relative marriage rate; whereas, the model predicts that it should.

The explanatory power of the model presented here can be increased in a few ways. The first is by explicitly modeling the benefit and cost to each individual institution of marriage. The present model can only speak of relative benefits and costs. Additionally, if I were explicitly to model these benefits and costs, then a social complementarity that affects both the benefit and cost of the religious contract could be included. This would mean that the actions of all agents in the model would have an impact on a specific agent's personal benefit and cost of marrying religiously, for example, the benefit of religious marriage may be increasing in the number of Catholics. My empirical work supports the inclusion of this complementarity. Secondly, the agents in the model should be allowed to remain single. This would allow me to examine the civil and Catholic marriage rates independent of one another and make predictions regarding their absolute movements, unlike in the present model that allows only statement concerning relative movements. Finally, the decision of singles should be modeled in two ways, one in which they take into account changes in exit costs and one in which they do not. Then a comparison could be made between the two to discover which produces more accurate predictions.

Further research will formally model this modified theory, develop testable predictions from this model, and test them on a variety of data sets. Additionally, it would be interesting to investigate the degree to which the composition of Catholic marriage, that is, "pure" versus interfaith marriage, has responded to Catholic doctrinal change and US legal reform and what effect these compositional shifts have had on the Catholic marriage rate, the civil marriage rate, and the relative marriage rate.

Chapter 3

A Theoretical Model of Marriage as a Set of Two Institutions

3.1 Introduction

In the United States during the mid to late 1970s, the marital behavior of Catholics changed dramatically relative to the marital behavior of the total population. The Catholic marriage rate, that is, the number of Catholic marriages consecrated annually per 1000 Catholics, fell approximately 20 percent relative to the civil marriage rate, that is, the number of civil marriages performed annually per l000 individuals. This relative decrease was the result of an increase of 2 percent in the civil marriage rate and a decrease of 17 percent in the Catholic marriage rate. What makes this curious is that both before and after this period, the two marriage rates moved in tandem.[1] The goal of this essay is to explain the absolute movement of both the Catholic and civil marriage rates in the United States during this time period.

I hypothesize that both the increase of the civil marriage rate and the decrease of the Catholic marriage rate were due to a negative reaction among Catholics to Vatican II and *Humanae Vitae*, an encyclical that upheld the traditional sexual morality of the Catholic Church. This negative reaction resulted in the benefit of a Catholic marriage being decreased. In the previous chapter in

[1]For a detailed discussion of this data, refer to section 2.4.

which I studied the relative movement of the Catholic marriage rate[18], I proposed and tested two potential explanations of the relative decrease in the Catholic marriage rate: the reform of civil divorce law, and the Catholic reforms and decrees of the 1960s (Vatican II and *Humanae Vitae*). I imagined Catholic reforms potentially lowering both the benefit and the exit cost of a Catholic marriage. Empirically, I found that civil reform had no effect on relative marital behavior, that the decrease in the relative marriage rate, that is, the Catholic marriage rate divided by the civil marriage rate, was due to the Catholic reforms and decrees, and that the effect of Catholic reform was to decrease the benefit of a Catholic marriage. This chapter follows the previous one and tests whether my findings regarding the relative marriage rate are robust enough to explain the absolute movement of both marriage rates.

To test the validity of my hypothesis, I model marriage as a set of two contracts, one civil and one religious. I have chosen to model marriage in this manner because these two contracts have distinct benefits and costs and because entering one contract does not imply that an individual has entered the other. Given I am treating marriage as a set of two institutions, or contracts, the question then arises as to why changes in one institution would affect the behavior related to the other institution. What causes the interconnectedness of the two institutions? The interconnectedness arises because a couple is potentially entering *two* contracts for *one* arrangement, that is, a couple may enter both a civil and Catholic marriage contract simultaneously for a single marriage. In the model, a couple makes this choice based upon a comparison of the cost and benefit of each contract. Whereas the benefit and cost of a civil marriage do not depend upon anything other than the legal system, I model the benefit and cost of a Catholic marriage as depending upon the concentration of Catholics. In the model, the

driving force behind the change in marital behavior is a shift in the structure of the above social complementarity. After religious reform, the benefit and cost of a Catholic marriage depends less strongly upon the concentration of Catholics than before reform. In Chapter 2, I presented empirical evidence of the existence of this complementarity and its enervation after religious reform.

The model I construct has both a short-run and long-run equilibrium. The short-run equilibrium is the equilibrium in which the population parameters (the number of each type of agent) in the model is held constant; the long-run equilibrium is the equilibrium in which these parameters are allowed to vary in response to structural changes in the model. In this chapter, I focus on the short-run effects of religious reform because of the constancy of the demographics of US Catholics relative to the general US population during this period, and I leave the examination of the long-run effects for future work.

In the specific version of the model that I examine, religious reform decreases the benefit of a religious marriage. The model predicts that this reform will lead to a decrease in the religious marriage rate. The model predicts that religious reform will also affect the civil marriage rate. Reform leads to two contrary effects in the civil marriage rate. Religious believers choose to marry civilly earlier in life because their option value of remaining single has decreased after religious reform, but non-believers choose to marry later in life since they can be more selective when choosing a spouse due to believers being less selective. In the model, the first effect outweighs the second, and the civil marriage rate increases after religious reform. The model also speaks to the effect of reform on the interfaith marriage rate; it predicts that the interfaith marriage rate will increase after reform. The first two predictions match the data. I find that after Catholic reforms, the Catholic marriage rate decreases and the civil marriage rate increases.

The empirical work of numerous researchers is mixed regarding the response of the interfaith marriage rate to the social changes of the 1960s.

To my knowledge, marriage has not been studied formally and empirically as a set of two institutions. Numerous researchers have examined the relationship between civil divorce law and civil divorce rates. Among others, Friedberg[15] and Wolfers[41] have examined this relationship. Two of the very few papers that examine the effect of divorce law reforms on the civil marriage rate are Rasul[33] and Matouschek and Rasul[27]. These studies fail to differentiate between the two institutions of marriage; and, as such, they fail to fully specify the motives individuals have for entering or exiting a given marital arrangement. Due to this, they are unable to explain or predict behavior that arises from an individual's choosing between the two institutions of marriage. Specifically, they are unable to explain the facts presented in this essay. Therefore, this distinction should be made not only for the sake of clarity and completeness but also to increase the explanatory power of the theory.

An additional reason for distinguishing between civil and Catholic marriage is that the Catholic marriage rate could be a better proxy for the strength of the social institution of marriage. The ultimate measure of the previous research examining civil marriage and divorce rates is its utility in assessing the strength and the factors affecting the strength of the social institution of marriage. The strength of the institution is directly related to and supported by the strength of the norms that direct individuals to marry and in which manner to marry and those that stigmatize divorce. Those entering into a religious marriage are likely more serious about the commitment they are undertaking than those entering only a civil marriage due to the added severity religion incorporates into marriage and are more strongly guided by social customs and norms. Due to this,

the Catholic marriage rate is potentially a better indicator of the strength of the norms supporting marriage and stigmatizing divorce and therefore the strength of the institution of marriage. Lastly, examining the interaction of the civil institution and the religious institution of marriage can help one to better understand generally how legal and social institutions interact and affect one another. For example, researchers can better understand when the two types of institutions are complements and when they are substitutes. These types of interactions should be better understood to ensure stable social institutions with the aim of increasing overall social welfare.

I contribute to the theoretical literature with my novel recasting of marriage as a set of two contracts and my study of the interaction between these two contracts. I know of no other papers that formally consider marriage as a 'dual' contract. In fact, even formally considering marriage as a contract is relatively new to the economics literature. Moreover, I contribute to the empirical literature by studying the effect of both the reform of civil divorce law and of Catholic doctrine on the civil and Catholic marriage rates simultaneously.

3.2 General Theory

I construct a search model that incorporates the agent's marriage and divorce decisions. My model follows the work of other economists that have used search models to study marital formation and dissolution, for example, [33] and [27], but my work greatly extends theirs by including two institutions of marriage within the theory. In the model, there are two types of marriage, civil and religious. The agents may either be married civilly or both civilly and religiously. What distinguishes these two types of marriage are their respective entry costs,

exit costs, and marital benefits. The civil institution has no entry costs associated with it, and its benefit is m^c. There is a cost to exit a civil marriage; this cost is ξ and must be paid immediately upon exit. There is an entry cost γ associated with the religious institution. The benefit to being in both a civil and religious marriage is $m^r = m^c(1 + \Sigma(\Omega, \rho))$. The added benefit to being in both a civil and religious marriage, $\Sigma(\Omega, \rho)$, depends upon the number of believers in the world, Ω, and whether there has been religious reform, ρ. If there has been reform, ρ is 1; otherwise, it is 0. As ρ changes from 0 to 1, Σ decreases for all values of Ω. This structure of the complementarity is supported by empirical evidence[18]. If a couple is both civilly and religiously married, they can exit the civil institution alone and pay ξ and $\Gamma(\Omega, \rho)$. In this case, $\Gamma(\Omega, \rho)$ can thought of as the social stigma associated with exiting a marriage. If the couple exits both institutions, they must pay the above costs plus ξ_r, the cost of an annulment. Any agent that chooses not to receive a religious annulment is unable to marry religiously in the future.

The model is populated by an unit measure of agents, .5 women and .5 men. The agents are heterogeneous and identified by three variables, M, θ, and ψ. M is an agent's marital capital stock. This capital stock is used in the production of a marriage benefit, m^θ. θ is the agent's marital status. An agent can either be single (s), engaged in a civil marriage (c), or engaged in both a civil and a religious marriage (r). ψ is an agent's belief status. If ψ is 1, then an agent is a believer in the religious institution of marriage. This implies that an agent can enter a religious marriage. If ψ is 0, then an agent is a non-believer and cannot enter a religious marriage. At the end of every period, κ agents die. κ is spread evenly across all agent types. At the beginning of every period, the κ agents that died yesterday are replaced with new-born single agents, ϕ of which are believers. The

number of single agents is λ, which is composed of single believers, λ_1, and single non-believers, λ_0. Thus, $\lambda = \lambda_1 + \lambda_0$. The number of married agents is μ, which is composed of married believers, μ_1, and married non-believers, μ_0. $\lambda + \mu = 1$. Additionally, the total number of believers is $\Omega = \lambda_1 + \mu_1$.

The timing of each period for single agents is as follows. There are λ_1 believers and λ_0 non-believers. The period begins, and a single male agent with state (ψ_i) meets a single female agent j with state (ψ_j) with certainty. Agent i meets a single believer with probability λ_1 and a single non-believer with probability λ_0. This couple draws a couple-specific marital stock, M_{ij}, from an unconditional distribution $G(\cdot)$. Given M_{ij}, the couple must then choose whether to marry. If $\psi_i + \psi_j = 2$, that is, both are believers, then the couple's options are to remain single, to enter a civil marriage, or to enter both a civil and religious marriage. If $\psi_i + \psi_j < 2$, the couple's options are to remain single or to enter a civil marriage. If an interfaith couple, that is, $\psi_i + \psi_j = 1$, chooses to enter a civil marriage, both agents become non-believers. In any of the above circumstances, if either agent chooses to remain single, then the couple splits apart, and both agents return to their respective singles pool.

The timing of each period for married agents is as follows. If an agent is only civilly married, then he enters the period with state (M, ψ). First, he receives $m^c(M)$, the benefit to a civil marriage; then he receives a new M' that is drawn from a conditional distribution $F(\cdot|M)$ that has the property $\dfrac{\mathrm{d}F(\cdot|M)}{\mathrm{d}M} < 0$. After receiving M', the agent decides whether to divorce his spouse or remain married. If he chooses to divorce, the agent must pay the exit cost of a civil divorce, ξ, immediately; and he returns to the singles pool. If an agent is both civilly and religiously married, he enters the period with state $(M, 1)$. ψ is equal to 1 because an agent must be a believer to enter a religious marriage. The agent receives his

marital benefit $m^r(M)$, and then he draws a M' from the conditional distribution $F(\cdot|M)$ (the same distribution the civilly married agents use). Given M', the agent decides whether to obtain a civil divorce but no religious annulment, to obtain both a civil divorce and a religious annulment, or remain both civilly and religiously married. If he chooses to divorce but not annul, he must pay the cost of civil divorce, ξ, plus a social cost of exiting the religious marriage, $\Gamma(\Omega, \rho)$, and becomes a non-believer. This agent can no longer marry religiously. If he chooses to divorce and to annul, he must pay the cost of a annulment, ξ_r, in addition to ξ and $\Gamma(\Omega, \rho)$. If the agent receives an annulment, he remains a believer and is able to marry religiously in the future. Thus, an agent would only receive an annulment if he believed the added cost ξ_r was outweighed by the option value of marrying religiously. Notice that the above structure guarantees that both spouses engaged in a marriage are identical so there is no need to distinguish between spouses.

I first describe the value functions for single agents. With certainty a single male agent i that is a believer meets a single female agent j. With probability λ_1, agent j will be a believer; and with probability λ_0, she will be a non-believer. The couple then draws a couple-specific marital capital stock M_{ij} and must decide if and how to marry. If $\psi_j = 1$, the couple may marry religiously. If $\psi_j = 0$, they only have the option of a civil marriage. After entering the period and meeting a potential spouse, agent i's value function is $V_s(\psi_i, \psi_j)$. Thus, when a believer i meets a potential spouse j who is also a believer, his value function is

$$V_s(1,1) = (1-\kappa)\beta E[max\{V_c(M,1), V_r(M,1) - \gamma, V_s(1)\}].$$

$V_c(M,1)$ is the value for i of entering a civil marriage with j, and $V_r(M,1)$ is the value of entering into both a civil and religious marriage with j. γ is a one-time fixed cost that an agent must pay if he chooses to enter both a civil and religious

marriage. $V_s(1)$ is the expected value to i of remaining single (described below). If believer i meets a non-believer j, his value function is

$$V_s(1,0) = (1-\kappa)\beta E[max\{V_c(M,0), V_s(1)\}].$$

$V_c(M,0)$ is the value for a believer of entering into a civil marriage with a non-believer. Notice that ψ_i becomes 0, that is, agent i becomes a non-believer. Once again, $V_s(1)$ is the expected value for i of remaining single. Given the above two equations, the expected value of being single for a believer when he first enters into the period and has not yet meet a potential spouse is

$$EV_s(1) = \lambda_1 V_s(1,1) + \lambda_0 V_s(1,0) \tag{3.1}$$

where λ_1 is the number of believers and λ_0 is the number of non-believers.

When a single male agent i is a non-believer, his marital options do not depend upon his potential spouse's ψ_j. If i meets a believer j, his value function is

$$V_s(0,1) = (1-\kappa)\beta E[max\{V_c(M,0), V_s(0)\}]$$

with $V_c(M,0)$ the value of marrying j civilly and $V_s(0)$ is the expected value of remaining single (described below). If i meets another non-believer j, his value function is

$$V_s(0,0) = (1-\kappa)\beta E[max\{V_c(M,0), V_s(0)\}]$$

Given these two equations, the expected value of being single for i when he first enters into the period but has not yet meet a potential spouse is

$$EV_s(0) = \lambda_1 V_s(0,1) + \lambda_0 V_s(0,0) \tag{3.2}$$

where λ_1 is the number of believers and λ_0 is the number of non-believers.

An agent that is civilly married comes into the period with the state (M, ψ). The value function of an individual in a civil marriage is

$$V_c(M, \psi) = u(m^c) + E[max\{-\xi + (1-\kappa)\beta V_s(\psi), (1-\kappa)\beta V_c(M', \psi)\}|M] \quad (3.3)$$

The agent first receives his marital benefit m^c. The agent values this benefit with the utility function $u(\cdot)$. This function is the same across all agents. After drawing M', the agent must decide whether to divorce or remain married. $V_s(\psi)$ is the value of receiving a civil divorce. This value is discounted because it is not received until next period. ξ is the cost of a civil divorce; it must be paid this period. $V_c(M', \psi)$ is the value of remaining in a civil marriage. Note that ψ does not take on a specific value here because the two spouses in a civil marriage may be both believers or both non-believers.

An agent that is engaged in both a civil and religious marriage comes into the period with the state $(M, 1)$. ψ is equal to 1 because an agent must be a believer to enter a religious marriage. His value function is

$$\begin{aligned} V_r(M, 1) = u(m^r) + E[max\{&-(\xi + \Gamma(\Omega, \rho)) + (1-\kappa)\beta V_s(0), \\ &-(\xi + \xi_r + \Gamma(\Omega, \rho)) + (1-\kappa)\beta V_s(1), (1-\kappa)\beta V_r(M', 1)\}|M] \end{aligned} \quad (3.4)$$

The agent receives the marital benefit m^r and values it with $u(\cdot)$. He then draws a M' and decides whether to divorce, to divorce and to annul, or to remain civilly and religiously married. $V_s(0)$ is the value of receiving a civil divorce but not a religious annulment. Notice that the agent becomes a non-believer, that is, $\psi = 0$. This is meant to mimic the fact that divorced Catholics are unable to remarry within the Catholic Church if they are not granted an annulment. This value is discounted because it is received next period. The agent must pay the associated costs $\xi + \Gamma(\Omega, \rho)$ this period. $\Gamma(\Omega, \rho)$ is a social cost related to exiting a religious marriage. It can be thought of as a social stigma. This cost is dependent upon

the number of believers and also upon whether there has be religious reform. $V_s(1)$ is the value of receiving both a civil divorce and a religious annulment; this value is received tomorrow. The associated costs that must be paid today are $\xi + \xi_r + \Gamma(\Omega, \rho)$. ξ_r is the cost of filing for and receiving an annulment. If a couple chooses remain in both institutions, they receive $V_r(M', 1)$ tomorrow.

3.3 Specific Theory

In this section, I make one major, simplifying assumption and then solve the model. I assume that there is no uncertainty within a marriage. Once two agents decide to marry, they receive the same M in perpetuity. I do this for two reasons. The first is that the main uncertainty I am interested in examining is the uncertainty related to religious reform, and therefore marital uncertainty adds an unnecessary, complicating factor. The second reason is that in the specific model that results from this assumption, single agents do not take into account the changes in the exit cost of the either the civil or religious institution of marriage. I later present evidence that this is the case.

I now solve for the specific values of $V_c(M, 0)$, $V_c(M, 1)$, and $V_r(M, 1)$. To simplify the algebra, I assume the following. $u(\cdot)$ is linear. $\Sigma(\Omega, \rho)$ is $\Pi(\rho)\Omega$ with $\Pi(\rho) > 0$ and $\dfrac{d\Pi}{d\rho} < 0$. $m_c = M$, and $m_r = M(1 + \Sigma(\Omega, \rho))$. To solve for the value functions, one must know whether an agent would ever exit a marriage of any type. It is the case that an agent never exits a marriage, irrelevant of what type of marriage in which he is engaged. To prove this, the following is useful.

Lemma 1. $V_s(1) \geq V_s(0)$

Proof. By comparing equations (3.1) and (3.2), one can see that the only essen-

tial difference in the value between the two is due to the added option of religious marriage in (3.1), that is, the addition of $V_r(M,1) - \gamma$. If I remove this option, $V_c(M,1) = V_c(M,0)$ and $V_s(1) = V_s(0)$. By adding the option of religious marriage, the value of $V_s(1)$ can only be increased or remain the same; this addition could never lower the its value because if $V_r(M,1) - \gamma < max\{V_c(M,1), V_s(1)\}$, the agent would never choose it. □

Lemma 2. Given no uncertainty in marriage, no agent exits a civil marriage.

Proof. There are three cases to consider here, (1) two believers engaged in a civil marriage, (2) two non-believers engaged in a civil marriage, and (3) two non-believers, one of which was previously a believer, engaged in a civil marriage.

(1) $V_c(M,1) \geq max\{V_r(M,1) - \gamma, V_s(1)\} \Rightarrow V_c(M,1) \geq V_s(1) \Rightarrow (1 - \kappa)\beta V_c(M,1) \geq (1-\kappa)\beta V_s(1) - \xi \Rightarrow$ never exits a civil marriage.

(2) $V_c(M,0) \geq V_s(0) \Rightarrow (1-\kappa)\beta V_c(M,0) \geq (1-\kappa)\beta V_s(0) - \xi \Rightarrow$ never exits a civil marriage.

(3) In this case, there are two perspectives to consider, that of the believer and that of the non-believer. Recall that when the believer marries a non-believer, he himself becomes a non-believer. Thus, from the perspective of the non-believer, this case is the same as case 2; so she never exits the civil marriage. What then does the believer do? Since he has entered into a civil marriage, $V_c(M,0) \geq V_s(1)$. By Lemma 1, $V_c(M,0) \geq V_s(0)$. Thus, $(1-\kappa)\beta V_c(M,0) \geq (1-\kappa)\beta V_s(0) - \xi$, and

he never exits a civil marriage. □

Lemma 3. Given no uncertainty in marriage, no agent exits a religious marriage.

Proof. Since an agent must be a believer to enter into a religious marriage, both spouses in a religious marriage must be believers. For both spouses, it must be the case that $V_r(M,1) - \gamma \geq max\{V_c(M,1), V_s(1)\}$. Therefore, $(1-\kappa)\beta V_r(M,1) \geq (1-\kappa)\beta V_s(1) - (\xi + \xi_r + \Gamma(\Omega,\rho))$. Neither spouses chooses to both divorce and annul. By Lemma 1, $V_r(M,1) \geq V_s(1) \geq V_s(0)$. Therefore, $(1-\kappa)\beta V_r(M,1) \geq (1-\kappa)\beta V_s(0) - (\xi + \Gamma(\Omega,\rho))$. Neither spouse chooses to divorce. Thus, neither spouse chooses to exit a religious marriage. □

With these results, one is now able to calculate the specific values of $V_c(M,0)$, $V_c(M,1)$, and $V_r(M,1)$. Since once agents are married they choose to remain married forever, one can simplify (3.3) and (3.4) significantly. These equations become

$$V_c(M,0) = \frac{M}{1-(1-\kappa)\beta} \tag{3.5}$$

$$V_c(M,1) = \frac{M}{1-(1-\kappa)\beta} \tag{3.6}$$

$$V_r(M,1) = \frac{M(1+\Sigma(\Omega,\rho))}{1-(1-\kappa)\beta} \tag{3.7}$$

Additionally, as is typically the case in search models, there exists optimal

cut-off points. Defining $E_{[a,b]}x$ as $\int_{[a,b]} xdG(x)$, (3.1) and (3.2) can be rewritten as

$$V_s(1) = \lambda_1(1-\kappa)\beta E_{[\underline{M},\, \overline{M}_1]}[V_s(1)] + \lambda_1(1-\kappa)\beta E_{[\overline{M}_1,\, \overline{\overline{M}}_1]}[V_c(M,1)]$$
$$+\lambda_1(1-\kappa)\beta E_{[\overline{\overline{M}}_1,\, \overline{M}]}[V_r(M,1)-\gamma] + \lambda_0(1-\kappa)\beta E_{[\underline{M},\, \overline{M}_{10}]}[V_s(1)]$$
$$+\lambda_0(1-\kappa)\beta E_{[\overline{M}_{10},\, \overline{M}]}[V_c(M,0)],$$
$$V_s(0) = \lambda_0(1-\kappa)\beta E_{[\underline{M},\, \overline{M}_0]}[V_s(0)] + \lambda_0(1-\kappa)\beta E_{[\overline{M}_0,\, \overline{M}]}[V_c(M,0)]$$
$$+\lambda_1(1-\kappa)\beta E_{[\underline{M},\, \overline{M}_{10}]}[V_s(0)] + \lambda_1(1-\kappa)\beta E_{[\overline{M}_{10},\, \overline{M}]}[V_c(M,0)]$$

$\overline{M}$ and $\underline{M}$ are the upper and lower bounds of the support of M. If two believers meet and draw an M below $\overline{M}_1$, they return to the singles' pool. If they draw an M above $\overline{M}_1$ and below $\overline{\overline{M}}_1$, they choose to enter into a civil marriage. If they draw an M above $\overline{\overline{M}}_1$, they enter into a religious marriage. If a believer meets a non-believer and they draw a M above $\overline{M}_{10}$, the believer chooses to enter a civil marriage with the non-believer; otherwise, he chooses to remain single. When a non-believer meets a single non-believer and the couple draws an M above $\overline{M}_0$, she chooses to marry civilly; otherwise, she chooses to remain single. When a non-believer meets a single believer and the couple draws an M above $\overline{M}_{10}$, the two marry civilly. The reason the cut-off is $\overline{M}_{10}$ and not $\overline{M}_0$ in this case is due to the fact that that $\overline{M}_{10} \geq \overline{M}_0$. Thus, the believer is the limiting factor in an interfaith marital decision.

Since neither $V_s(1)$ nor $V_s(0)$ depend upon M, $V_s(1)$ and $V_s(0)$ can be factored out and solved for explicitly,

$$V_s(0) = \frac{\lambda_0(1-\kappa)\beta E_{[\overline{M}_0,\, \overline{M}]}[V_c(M,0)] + \lambda_1(1-\kappa)\beta E_{[\overline{M}_{10},\, \overline{M}]}[V_c(M,0)]}{1-\lambda_0(1-\kappa)\beta G(\overline{M}_0) - \lambda_1(1-\kappa)\beta G(\overline{M}_{10})} \tag{3.8}$$

$$V_s(1) = \{\lambda_1(1-\kappa)\beta E_{[\overline{M}_1,\, \overline{\overline{M}}_1]}[V_c(M,1)] + \lambda_1(1-\kappa)\beta E_{[\overline{\overline{M}}_1,\, \overline{M}]}[V_r(M,1)-\gamma]$$
$$+ \lambda_0(1-\kappa)\beta E_{[\overline{M}_{10},\, \overline{M}]}[V_c(M,0)]\}\frac{1}{1-\lambda_1(1-\kappa)\beta G(\overline{M}_1) - \lambda_0(1-\kappa)\beta G(\overline{M}_{10})}. \tag{3.9}$$

Lemma 4. If γ is sufficiently large, $\overline{\overline{M}}_1 > \overline{M}_1$.

Proof. Note that $V(\overline{\overline{M}}_1, r, 1) - \gamma = V(\overline{\overline{M}}_1, c, 1)$ and thus $\frac{\overline{\overline{M}}_1(1+\Sigma(\Omega,\rho))}{1-(1-\kappa)\beta} - \gamma = \frac{\overline{\overline{M}}_1}{1-(1-\kappa)\beta}$. This implies $\overline{\overline{M}}_1 = \gamma\frac{1-(1-\kappa)\beta}{\Sigma(\Omega,\rho)}$. $\overline{\overline{M}}_1$ is increasing in γ. $\overline{M}_1$ is determined by $V_c(\overline{M}_1, 1) = V_s(1)$. Additionally, $V_s(1)$ is decreasing in γ and $V_c(M, 1)$ is increasing in M. Thus, an increase in γ causes a decrease in $\overline{M}_1$. □

Throughout the remainder of the essay, I assume that γ is sufficiently large so that $\overline{\overline{M}}_1 > \overline{M}_1$. With the value functions and optimal cut-offs now specified, one is able to calculate the various marriage rates. The religious marriage rate, the interfaith marriage rate, and the civil marriage rate are, respectively,

$$\frac{.5\lambda_1\lambda_1(1-G(\overline{\overline{M}}_1))}{\lambda_1+\mu_1} \tag{3.10}$$

$$.5(\lambda_1\lambda_0+\lambda_0\lambda_1)(1-G(\overline{M}_{10})) \tag{3.11}$$

$$.5\lambda_0\lambda_0(1-G(\overline{M}_0)) + .5(\lambda_1\lambda_0+\lambda_0\lambda_1)(1-G(\overline{M}_{10})) + .5\lambda_1\lambda_1(1-G(\overline{M}_1)). \tag{3.12}$$

The religious marriage rate is calculated as the number of couples composed of two believers ($.5\lambda_1^2$) that draw an $M \geq \overline{\overline{M}}_1$ divided by the total number of believers, $\lambda_1+\mu_1$. The interfaith marriage rate is the number of couples composed of either a male believer and female non-believer ($.5\lambda_1\lambda_0$) or a male non-believer and female believer ($.5\lambda_0\lambda_1$) that draw an $M \geq \overline{M}_{10}$. The civil marriage rate is the sum of three distinct components. The first is the number of couples composed of two non-believers ($.5\lambda_0^2$) that draw an $M \geq \overline{M}_0$. The second is the interfaith marriage rate, and the third is the number of couples composed of two believers ($.5\lambda_1^2$) that draw an M such that $M \geq \overline{M}_1$. These last two quantities are divided by the total population, which is equal to 1, to arrive at the respective rates.

I am interested in solving for a stationary equilibrium of this model. This model has two types of stationary equilibria, short-run and long-run. In the short-run, the population parameters are fixed; and the model is solved for $\overline{M}_1$, $\overline{\overline{M}}_1$, $\overline{M}_{10}$, and $\overline{M}_0$ using

$$V_c(\overline{M}_1, 1) = V_s(1) \tag{3.13}$$

$$V_c(\overline{\overline{M}}_1, 1) = V_r(\overline{\overline{M}}_1, 1) - \gamma \tag{3.14}$$

$$V_c(\overline{M}_{10}, 0) = V_s(1) \tag{3.15}$$

$$V_c(\overline{M}_0, 0) = V_s(0) \tag{3.16}$$

In the long-run, the population parameters are to free to vary. There are four population parameters: λ_0 (the number of single non-believers), λ_1 (the number of single believers), μ_0 (the number of married non-believers), and μ_1 (the number of married believers). Thus, four more equations are required to solve a long-run equilibrium. In a long-run, stationary equilibrium, it must be the case that the inflow into each of these segments of the population is equal to the outflow. This is represented by the following four equations:

$$\phi\kappa = \lambda_1^2(1 - G(\overline{M}_1)) + \lambda_1\lambda_0(1 - G(\overline{M}_{10})) + \lambda_1\kappa \tag{3.17}$$

$$(1-\phi)\kappa = \lambda_0^2(1 - G(\overline{M}_0)) + \lambda_1\lambda_0(1 - G(\overline{M}_{10})) + \lambda_0\kappa \tag{3.18}$$

$$\lambda_1^2(1 - G(\overline{M}_1)) = \mu_1\kappa \tag{3.19}$$

$$2\lambda_1\lambda_0(1 - G(\overline{M}_{10})) + \lambda_0^2(1 - G(\overline{M}_0)) = \mu_0\kappa \tag{3.20}$$

Equations (3.17) and (3.18) imply that $\phi > \lambda_1 > 0$ and $(1-\phi) > \lambda_0 > 0$. This in turn implies that $\mu_1, \mu_0 > 0$ and have some positive upper bound. Thus, there does not exist an equilibrium in which there are no believers. In fact, there is an unique equilibrium with $\overline{M}_0$, $\overline{M}_1$, $\overline{M}_{10}$, $\overline{\overline{M}}_1$, λ_0, λ_1, μ_0, and μ_1 determined by (3.13)-(3.20).

3.4 Theoretical Implications

I now study the short-run implications of the theory. I focus on the short-run for two reasons. First of all, the length of time I am studying seems insufficient for large scale responses in the Catholic or general US population to have occurred. Secondly, the empirical evidence does not point to a shift in Catholic demographics relative to general US demographics. Thus, I believe the most salient equilibrium is the short-run equilibrium.

In the short-run, the population parameters, that is, λ_0, λ_1, μ_0, and μ_1, are held fixed and not allowed to vary in response to structural changes in the model. With these parameters fixed, I would like to know what happens to the religious, interfaith, and civil marriage rates after the institution of religious reform. This requires one to examine how religious reforms affect the cut-off points, $\overline{M}_1$, $\overline{\overline{M}}_1$, $\overline{M}_{10}$, and $\overline{M}_0$.

When religious reform is implemented, $\Sigma(\Omega, \rho)$ is lowered; this is due to the fact that $\Pi(\rho)$ is decreased. To understand how this change affects the various marriage rates, one must study the equilibrium conditions (3.13)-(3.16) to discover how the cut-off values vary in response to a change in $\Pi(\rho)$.

Theorem 1. Given that $G(\cdot)$ is the uniform distribution with support $[0, b]$. After religious reform, (1) $\overline{M}_1$ decreases, (2) $\overline{M}_{10}$ decreases, (3) $\overline{\overline{M}}_1$ increases, and (4) $\overline{M}_0$ increases.

Proof. To prove this, one must totally differentiate (3.13) - (3.16) with respect to the four cut-off points and Π. First, notice that (3.13) and (3.15) are redundant; therefore, $\overline{M}_1 = \overline{M}_{10}$.

(1) & (2) If one totally differentiates equation (3.13) and gathers the non-zero terms, one finds that

$$\frac{\mathrm{d}\overline{M}_1}{\mathrm{d}\Pi} = \frac{\frac{\partial V_s(1)}{\partial \Pi}}{\frac{\partial V_c(\overline{M}_1,1)}{\partial \overline{M}_1} - \frac{\partial V_s(1)}{\partial \overline{M}_1}} > 0.$$

The numerator can easily be shown to be positive. The denominator is also positive. This must the case because at $\overline{M}_1$, $V_c(M,1)$ intersects $V_s(1)$ from below. Thus, as Π decreases, $\overline{M}_1$ and $\overline{M}_{10}$ also decrease.

(3) Totally differentiating (3.14), one finds that

$$\frac{\mathrm{d}\overline{\overline{M}}_1}{\mathrm{d}\Pi} = -\frac{\overline{\overline{M}}_1}{\Pi} < 0.$$

Thus, as Π decreases, $\overline{\overline{M}}_1$ increases.

(4) Religious reform does not have a direct effect on $\overline{M}_0$; the effect of reform is felt indirectly through $\overline{M}_1$. Thus, totally differentiating (3.16), one finds that

$$\frac{\mathrm{d}\overline{M}_0}{\mathrm{d}\overline{M}_1}\frac{\mathrm{d}\overline{M}_1}{\mathrm{d}\Pi} = \frac{\frac{\partial V_s(0)}{\partial \overline{M}_1}}{\frac{\partial V_c(\overline{M}_0,0)}{\partial \overline{M}_0} - \frac{\partial V_s(0)}{\partial \overline{M}_0}}\frac{\mathrm{d}\overline{M}_1}{\mathrm{d}\Pi} < 0.$$

The denominator is positive. This must the case because at $\overline{M}_0$, $V_c(M,0)$ intersects $V_s(0)$ from below. Given that G(M) is the uniform distribution with support [0,b], the numerator takes the sign of $\frac{1}{b} - \frac{V_s(1)}{bV_s(0)}$. In equilibrium, this is equal to $1 - \frac{\overline{M}_1}{\overline{\overline{M}}_0}$. This is negative since $\overline{M}_0 < \overline{M}_1$. From above, one knows that $\frac{\mathrm{d}\overline{M}_1}{\mathrm{d}\Pi}$ is positive. □

Theorem 2. After religious reform (1) the religious marriage rate decreases, (2) the interfaith marriage rate increases, and (3) the civil marriage rate could either increase or decrease.

Proof. The religious marriage rate is

$$\frac{.5\lambda_1\lambda_1(1-G(\overline{\overline{M}}_1))}{\Omega}.$$

From Theorem 1, $\overline{\overline{M}}_1$ increases after religion reform. Since $G(\cdot)$ is increasing in M, the religious marriage rate decreases. The interfaith marriage rate is

$$.5(\lambda_1\lambda_0+\lambda_0\lambda_1)(1-G(\overline{M}_{10})).$$

From Theorem 1, $\overline{M}_{10}$ decreases after religious reform; thus, the interfaith rate increases. The civil marriage rate is

$$.5\lambda_0\lambda_0(1-G(\overline{M}_0))+.5(\lambda_1\lambda_0+\lambda_0\lambda_1)(1-G(\overline{M}_{10}))+.5\lambda_1\lambda_1(1-G(\overline{M}_1))$$

From Theorem 1, after religious reform $\overline{M}_0$ increases, and $\overline{M}_{10}=\overline{M}_1$ decreases. Thus, after reform, there are two contrary effects on the civil rate. First, consider the second and third terms of the civil rate. Both of these terms increase after reform because believers are now less selective when choosing a marriage partner. Second, consider the first term; this term decreases after reform. It decreases because non-believers become more selective since believers are now less selective in their marriage partners. □

Lemma 5. Given that $G(\cdot)$ is the uniform distribution with support $[0,b]$ and that γ (the entry cost of a religious marriage) is a linear function of b, then the four cut-off points are linear functions of b.

Proof. To prove this, assume that the cut-off points are linear functions of b and substitute these functions into equations (3.13)-(3.16). □

Theorem 3. Given that $G(\cdot)$ is the uniform distribution with support $[0, b]$ and that γ (the entry cost of a religious marriage) is a linear function of b, the civil marriage rate increases after religious reform.

Proof. By Lemma 5, one knows that the cut-off points are linear functions of b:

$$\overline{M}_0 = Ab$$

$$\overline{M}_{10} = \overline{M}_1 = Bb$$

$$\overline{\overline{M}}_1 = Cb$$

$$\gamma = Db.$$

Differentiate (3.12) with respect to Π:

$$-.5\lambda_0\lambda_0\frac{1}{b}\frac{\mathrm{d}\overline{M}_0}{\mathrm{d}\Pi} - .5(\lambda_1\lambda_0 + \lambda_0\lambda_1)\frac{1}{b}\frac{\mathrm{d}\overline{M}_{10}}{\mathrm{d}\Pi} - .5\lambda_1\lambda_1\frac{1}{b}\frac{\mathrm{d}\overline{M}_1}{\mathrm{d}\Pi}.$$

Assuming the uniform distribution, find $\frac{\mathrm{d}\overline{M}_0}{\mathrm{d}\Pi}$, $\frac{\mathrm{d}\overline{M}_{10}}{\mathrm{d}\Pi}$, and $\frac{\mathrm{d}\overline{M}_1}{\mathrm{d}\Pi}$ and substitute them into the above equation. If one does this, one finds that the civil rate will increase after religious reform if

$$\frac{\lambda_0^2(1-\kappa)\beta(B-A)}{(1-\kappa)\beta(\lambda_0 A + \lambda_1 B) - 1} - (\lambda_0 + \lambda_1) < 0.$$

The denominator of the first term is always negative. This is the case since A and B are both < 1. The numerator of the first term is non-negative. From Lemma 1 and equations (3.15) and (3.16), $\overline{M}_1 \geq \overline{M}_0$. Thus, $B \geq A$. □

3.5 Empirical Implications

I test the following predictions, following the Catholic reforms of the mid to late 1960s,

- the civil marriage rate increases
- the Catholic marriage rate decreases, and
- the interfaith marriage rate increases.

I test the first two predictions using a state-level panel of the Catholic marriage rate and of the civil marriage rate. These data were obtained from the Official Catholic Directory (OCD) and from the Centers for Disease Control, respectively. This panel is balanced and covers 49 states from 1960 to 1992. Ellman and Lohr[11], whose no-fault coding I use, do not list a no-fault reform data for Nevada so I do not include it in any of the regressions to make my results more easily comparable across different regressions. I use Friedberg's[15] coding for the shift to unilateral consent. Due to the lack of a decent time series in the OCD, I turn to evidence presented in the sociology literature to test the last prediction.

Also, recall that I made a major simplifying assumption in the model, that there is no uncertainty after marrying. This does not mean that there actually is no uncertainty after marrying, only that single individuals make their marital decisions as if that were the case. In other words, single agents make their marital decision under the assumption that if they marry, they will remain married forever. The main implication of this assumption is that changes in the exit cost of either marital institution will not affect the marital decision of a single agent. If my assumption is correct, then

- the reform of civil divorce law will have no effect on either the civil or Catholic marriage rate, and
- the reform of Catholic doctrine will have a non-positive effect on the Catholic marriage rate.

I am able to test the validity of this assumption, based upon its implications, with the above-mentioned panel.

To estimate the relationship among the civil marriage rate, the Catholic marriage rate, and legal and religious reform, I use the following equations as my baseline specifications:

$$\begin{aligned} civrate_{s,t} = \alpha_s + \gamma_t + \beta^v Vatican_t + \beta^u Unilateral_{s,t} + \beta^n Nofault_{s,t} \\ + \beta^c Cathper_{s,t} + \beta^{vp} Vatper_{s,t} + \beta^{cath} Cathrate_{s,t} + \epsilon_{s,t}, \end{aligned} \tag{3.21}$$

$$\begin{aligned} cathrate_{s,t} = \alpha_s + \gamma_t + \beta^v Vatican_t + \beta^u Unilateral_{s,t} + \beta^n Nofault_{s,t} \\ + \beta^c Cathper_{s,t} + \beta^{vp} Vatper_{s,t} + \beta^{civ} Civrate_{s,t} + \epsilon_{s,t}, \end{aligned} \tag{3.22}$$

civrate is the civil marriage rate, and *cathrate* is the Catholic marriage rate. α is a state fixed effect, and γ is a year fixed effect. *Unilateral* is an indicator variable that is 1 in the year of unilateral reform and afterwards, and it is 0 otherwise; *Nofault* is an indicator variable that is 1 if a no-fault divorce law regime is in place and 0 otherwise. *Vatican* is an indicator variable that is 1 in 1965, the ending year of Vatican II, and afterwards; otherwise, it is 0.[2] *Catper* is the percentage of Catholics in a given state in a given year. Finally, *Vatper* is an interaction of *Vatican* and *Catper*. *Vatper* is meant to capture the social complementarity that I modeled as $\Sigma(\Omega, \rho)$. These equations are sufficiently general to eliminate the

[2]I also substitute for the *Vatican* indicator, an indicator that is 1 in 1968 and afterwards, and 0 otherwise. *Humanae Vitae* came into effect in 1968. My results are not affected.

Table 3.1: Reform Effects on the Civil Marriage Rate

	Dependent variable: Civil Rate		
	(1)	(2)	(3)
Unilateral	-.323 (.366)	-	-.330 (.363)
No-fault	.279 (.358)	-	.279 (.358)
Vatican	-	1.81 (.386)**	1.81 (.361)**
% Cath	-.005 (.279)	-.411 (1.38)	-.538 (1.35)
% Cath * Vatican	-	.433 (1.28)	.540 (1.24)
Cathrate	.197 (.078)*	.219 (.075)**	.203 (.081)*
Adj R^2	.806	.805	.806
Obs	1615	1615	1615

Notes: Sample covers 49 states (NV is dropped) from 1960 to 1992. Standard errors are in parentheses. All standard errors are robust and adjusted for clustering. ** significant at 1 percent level. * significant at 5 percent level. All regressions include State and Year Fixed Effects.

need to add all covariates that are time-independent within each state or that are time-dependent but state-independent.

The results of the above two regressions are presented in Table 3.1, column (3) and Table 3.2, column (3). The sign and significance of the coefficients in Table 3.1 confirm our predictions. Following Catholic reform, the civil marriage rate increases as predicted by the model. The coefficient on *Vatican* is equal to 1.81 and is statistically significant. The total effect of Catholic reform on the civil rate is 1.91 with a standard error of .238 evaluated at the mean of *%Cath*, is 1.82 with a standard error of .337 at the mean less one standard deviation, and is 2.01 with a standard error of .306 at the mean plus one standard deviation. Additionally, the civil marriage rate does not response to changes in civil divorce law, either no-fault or unilateral reform. These facts validate my assumption that single agents do not in fact take into account changes in the exit cost of marital

Table 3.2: Reform Effects on the Catholic Marriage Rate

	Dependent variable: Catholic Rate		
	(1)	(2)	(3)
Unilateral	-.214 (.259)	-	-.165 (.257)
No-fault	.658 (.212)**	-	.644 (.213)**
Vatican	-	2.28 (.31)**	-1.55 (.329)**
% Cath	1.99 (.464)**	1.26 (.949)	1.19 (.910)
% Cath * Vatican	-	-3.28 (.797)**	-3.16 (.790)**
Civrate	.144 (.053)**	.159 (.052)**	.144 (.052)**
Adj R^2	.775	.774	.781
Obs	1615	1615	1615

See Notes for Table 3.1.

contracts when making their marital decision.

In Table 3.2, the coefficient on *Vatican* is -1.55 and significant. The total effect of *Vatican* is -2.19 with a standard error of .276 evaluated at the mean of *%Cath*, is -1.64 with standard error of .319 at the mean less one standard deviation, and is -2.75 with standard error of .298 at the mean plus one standard deviation. Thus, following Catholic reform the Catholic marriage rate decreased. This is in accord with my theoretical prediction. As opposed to those in Table 3.1, the coefficients on *Unilateral* and *No-fault* in Table 3.2 only partially validate my assumption that singles do not respond to changes in exit costs of civil marriage. The coefficient on *Unilateral* is insignificant, but the coefficient on *No-fault* is .644 and significant. The effect of *No-fault* is much smaller than the total effect of *Vatican* on the Catholic marriage rate, displaying its relative unimportance in an agent's marital decision.

I am unable to test the response of the interfaith marriage rate with data from the OCD. This is due to the fact the interfaith marriages counted in the OCD

are only those sanctioned by the Catholic Church. This most likely eliminates a large number of interfaith marriages. Additionally, no statistics prepared by the US government contain questions regarding religion due to the separation of church and state. No nation-wide surveys cover the entirety of the period I am interested in studying. The survey that comes closest is the General Social Survey (GSS), and it only begins in 1973. Thus, I turn to the empirical work of other researchers who do their best to find a pattern in exogamy with inadequate resources.

In 2007, the Center for Applied Research in the Apostolate (CARA) at Georgetown conducted a survey of a nationally-representative sample of 1008 Catholics regarding their marital behavior and knowledge of the Catholic institution of marriage[17]. The survey consisted of 4 birth cohorts, Pre-Vatican II (pre-1943), Vatican II (1943-1960), Post-Vatican II (1961-1981), and Millennial (post-1981). One of the questions asked of the respondents is if they are married to a non-Catholic. 21% of the Pre-Vatican II generation responded affirmatively, as did 28% of the Vatican II generation and 33% of the Post-Vatican II generation. One sees a significant jump in exogamy in the first generation married under the reforms of the late 1960s. Sherkat[34] and McCutcheon[28] both use at least 10 years of the GSS beginning in 1973. Both of these researchers also find a jump between the exogamy rate of the pre-Vatican II generation and the Vatican II generation.

Kalmijn[23] undertakes a more ambitious project; by combining the data from numerous surveys, he constructs a series of decade-long marital cohorts that stretches from the 1920s to the 1980s. He finds unambiguously that intermarriage between Catholics and Protestants (the two largest religious groups in the US) has increased by 65% over the last century. More relevant to this essay, he tests

whether the social changes of the 1960s affected the slope or intercept of the generally linear, downward trend of homogamy in his sample. He finds no evidence that the social changes occurring in the 1960s affected the trend of intermarriage at all. Kalmijn's results can be reasonably questioned, though, due to the potential biases that could arise from the melding of data across numerous surveys. Due to the limitations on time-series data regarding religious homogamy, the empirical results within the literature are mixed but seem to point to an increase in the interfaith marriage rate after Vatican II and *Humanae Vitae*.

3.6 Conclusion

In this essay, I attempt to explain the absolute movements of the civil and Catholic marriage rates during the mid-1970s to the early 1980s. During this time period, the Catholic marriage rate fell approximately 20 percent relative to the civil marriage rate. This relative decrease was the result of an increase of 2 percent in the civil marriage rate and a decrease of 17 percent in the Catholic marriage rate. What makes this curious is that both before and after this period, the two marriage rates followed the same trend. I propose and test the hypothesis that the cause of the movements in the civil and Catholic marriage rates was the Catholic reforms and decrees of the mid to late 1960s, that is, Vatican II and *Humanae Vitae*. To do this, I construct an original model and compare its implications against the implications of a fixed-effects regression analysis of a nationwide panel of marriage rates.

The theory presented here is meant to capture the essence of an individual's marital decision. The model is populated by single and married agents. Single agents have the option of entering a civil marital contract, entering both a civil and

religious marital contract, or remaining single. The civil and religious institutions of marriage are distinguishable due to their respective entry costs, exit costs, and marital benefits. Notably, the benefit and the exit cost of a religious marriage is dependent upon the number of believers in the model and whether religious reform has been instituted. Before religious reform, this complementarity depends more strongly upon the number of believers than after reform.

The theory is able to explain both the increase in the civil marriage rate and the decrease in the Catholic marriage rate. After religious reform, the value of entering into a religious marriage is decreased; as such, a smaller proportion of the population enters into a religious marriage, and the religious marriage rate decreases. A surprising result is that the institution of religious reform is also able to explain the increase in the civil marriage rate. Since the value of a religious marriage is decreased after religious reform, the option value of being a single believer is decreased. Thus, single believers, who before might have waited to find a high-quality match to marry both civilly and religiously, are now willing to accept a lower-quality match to marry only civilly and to marry immediately. This leads to an increase in the civil rate that would not have been seen otherwise. Additionally, I present strong evidence that single agents making a marital decision do not take into account the exit cost, or at least not changes in the exit cost, of either marital contract. When marrying, single agents act as if once married, they will remain married forever. This is contrary to previous published results and contrary to the common intuition of economists.

Thus, my model is not only novel but useful. Previous models that have looked on marriage as a single institution and examined an agent's marital decision have incompletely specified the motives of single agents. Due to this misspecification, the decision of these agents has been modeled inaccurately. Also, these

models have only been able to point to the reform of civil divorce law as a determinant of marital behavior and have been silent on the changes in the religious institution of marriage. As I have shown, civil divorce law reform is not a major determinant of the change in marital behavior seen in the 1970s. My model also draws the focus of research away from the effects of the changes in the exit costs of the marital contracts and directs it toward the effects of the changes in the benefits of these contracts.

In this chapter, I have focused on the short-run response of the marriage rates to reforms. Future research should examine more closely the long-run effects of these religious reforms. Specifically, it should focus on the changes in the population of single and married believers that might have arisen in response to reform and how these changes have effected the benefit and cost of marrying civilly and religiously. This research could be conducted by supplementing the panel presented here and conducting a long-run analysis of my model.

Chapter 4

A Theoretical Model of Religiosity and the Incidence of Domestic Violence

4.1 Introduction

Sociologists have demonstrated a negative correlation between religious involvement and the incidence of domestic violence[9, 14]. They have struggled though to uncover the specific pathway by which religious involvement affects the incidence of domestic violence. Numerous pathways have been proposed and found to be lacking. In addition, lacking a formal theory, it is unclear whether religious involvement and domestic violence are even causally related or are mere correlates. Therefore, in this essay, I propose and model a specific pathway connecting religious involvement and spousal abuse. I follow Mahoney et al. [25] and propose sanctification, specifically the sanctification of marriage, as the pathway that connects religious involvement and abusive behavior. I then test the reasonableness of this proposition by comparing the implications of the theory with the empirical facts.

In the sociology literature, it has been shown that church attendance, the most common measure of religious involvement, is inversely related to the incidence of domestic violence. This effect is significant for men who attend services at least once a week and for women who attend services at least once a month[9]. Following this work, Ellison and Anderson[10] examine three indirect pathways by which religious involvement could potentially decrease the likelihood of domes-

tic violence. They propose that those individuals highly involved in a religious community would be more socially integrated and have access to a larger social support system/network, would be less likely to abuse alcohol or drugs, and would have a higher level of self-esteem and a greater sense of intrinsic self-worth. Controlling for the above three pathways, the authors find that religious attendance continues to be significantly and inversely related to the level of domestic violence. In fact, they find the above controls do not decrease the explanatory power of attendance much, if at all. Therefore, one must look elsewhere for the pathway connecting religiosity and the incidence of domestic violence.

In a series of papers[24, 25], the sanctification of family is proposed as the specific means by which religion is able to influence domestic behavior. Mahoney et al.[25] define sanctification as "a psychological process through which aspects of life are perceived by people as having spiritual character and significance" (p. 221). When an individual sanctifies his family, or, in this case, his marriage, he perceives it as being a manifestation of his beliefs regarding the divine or, without reference to a specific god, he may attribute certain sacred qualities to it, such as holiness or eternalness. The initial findings of Mahoney and his co-authors indicate that higher levels of sanctification of marriage are associated with less frequent marital conflict and more collaboration to resolve disagreements. The authors warn, though, that they are unsure if their results are generalizable due to the limited nature of their sample. Specifically, they point out that sanctification may well have negative consequences. For example, sanctification may lead to a stubbornness of belief in regard to certain aspects of marital life that when disagreed upon by spouses leads to a potentially intractable conflict. To disentangle the positive and negative effects of sanctification, I formalize their theory.

The theory presented here models a potentially abusive marriage. There are two participants, the abuser (the husband) and the abused (the wife). The abuser's violent behavior serves two purposes, the first to vent stress and bring pleasure to the abuser (expressive violence) and the second to control one's spouse (instrumental violence). These are the two main purposes of violent domestic behavior documented by researchers[16]. In the model, each spouse must also allocate a scarce amount of time between producing a marital good and a personal consumption good. The level to which an agent sanctifies his own marriage affects his return to investing time in his marriage. The more an agent sanctifies his marriage, the higher the return he receives from investing his scarce time in his relationship. Additionally, each spouse has a productivity parameter that measures how effective he or she is at producing the personal consumption good. In another version of the model not presented here, I instead modeled the husband's and wife's utilities as being interdependent and sanctification as the weight that each spouse placed on the other's utility. The implications from these two variants of the model are very similar. Thus, my theoretical predictions are not idiosyncratic to the version of the model presented here.

The model predicts that the likelihood of violence is increasing in both the husband's and the wife's level of sanctification and the wife's productivity and is decreasing the husband's productivity and that the level of violence in an abusive relationship is determined by the relative values (husband relative to the wife) of sanctification and productivity. As the abuser's level of sanctification relative to the abused's is increased, he becomes more abusive. As his productivity (in making the personal consumption good) relative to the abused's is increased, he becomes less abusive. Also, I find that under fairly general conditions it is an equilibrium outcome of the model for an abused spouse to remain in a violent

relationship. It is perfectly reasonable for the abused spouse to remain in an abusive relationship as long as she is being compensated for the abuse she is receiving. The data partially match my theoretical predictions. With regard to sanctification, the data partially match my results if I choose degree of theological conservatism as a proxy for sanctification, but not if I choose church attendance. With regard to productivity (in making the personal consumption good), the data show that as the husband's years of schooling increase, the likelihood of violence decreases, but the wife's years of schooling have no effect.

The economics literature offers few models of domestic violence and none that incorporate religiosity. Tauchen et al.[39] construct a model that includes both expressive and instrumental violence. My model differs from theirs in that I include sanctification and model a sequential game. Farmer et al.[12] develop a model very similar to Tauchen et al.'s with similar predictions. Pollak[32] constructs an intergenerational model of domestic violence in which violent tendencies are transferred from parent to child. He focuses on how violent tendencies are passed from generation to generation. His model is solely probabilistic and lacks any form of optimizing behavior; and the motivation for violence in his model is solely expressive.

4.2 Theory

I model a non-cooperative, violent situation in a marital household. This situation involves two participants, a husband and a wife. I assume that the husband is the individual who uses violence and that the wife is the individual toward whom the husband's violent behavior is directed. The husband uses violence for two purposes. First, the husband derives utility directly from behaving violently

toward his wife. This benefit could be due to sadistic reasons or due to the fact that the violence serves as a means of venting stress. This type of violence is referred to as expressive violence. Second, the husband uses violence as means of coercing his wife to behave in a certain manner. This type of violence is referred to as instrumental violence.

The husband's utility is a function of the level of violence v that he chooses, the quality of his marriage Q, and his consumption c^h. The quality of a marriage Q is sum of the marital good M^h produced by the husband and the marital good M^w produced by the wife. The husband is only able to receive the benefit of engaging in violent behavior or of Q if he is married. His utility function is $u^h(v, Q, c^h)$ and is increasing in all three arguments. The husband has a fixed amount of time T that he must allocate between producing his marital good M^h and his consumption good c^h. The time that the husband devotes to the production of the marital good, t_m^h, is transformed into $g(t_m^h, S^h)$ units of M^h. S^h is the degree to which the husband sanctifies his marriage. The return to investing time in the production of the marital good is increasing in S^h, that is, $\dfrac{\partial^2 g}{\partial S^h \partial t_m^h} > 0$. The time that the husband devotes to the production of his consumption good, t_c^h, is transformed into $f(t_c^h, A^h)$ units of c^h, where A^h is an idiosyncratic productivity parameter. $\dfrac{\partial f}{\partial t_c^h}$ is increasing in A^h. The husband has an outside option that gives him utility $\overline{u}^h(T, A^h)$, which is equal to $u^h(0, 0, f(T, A^h))$, if he leaves the relationship. I assume the husband remains in the marriage if his utility in the relationship is at least as large as his utility if single.

The wife's utility function is $u^w(v, Q, c^w)$. Her utility is decreasing in the level of violence v, and is increasing in all other arguments. The wife must also allocate a fixed amount of time T between producing a marital good M^w and producing a consumption good c^w. If she devotes t_m^w to the production of M^w, the

wife produces $g(t_m^w, S^w)$ units of M^w. Notice that the wife potentially sanctifies her marriage at a level distinct from her husband, that is, S^w is not necessarily equal to S^h. The time she devotes to the production of her consumption good, t_c^w, is transformed into $f(t_c^w, A^w)$ units of c^w, where A^w is the wife's productivity parameter. Both the husband and the wife use the same functions $g(\cdot)$ and $f(\cdot)$. The wife has an outside option that gives her utility ϵ^w if she leaves the relationship. This outside option is randomly draw from the distribution $F(\cdot)$ with support $[-b, b]$, where $b > 0$. ϵ^w is drawn before any agent moves and is observable to all agents. I assume that the wife remains in the marriage as long as her utility in the relationship is at least as large as her utility if single.

The situation unfolds as follows. First, the wife chooses her level of t_m^w and t_c^w. After which, the husband chooses whether he desires to remain in the marriage or become single. If he remains in the marriage, he then chooses v, t_m^h, and t_c^h. If he exits the marriage, he receives $\overline{u}^h(T, A^h)$. If the husband chooses to remain in the marriage, the wife then chooses whether to remain in the marriage or exit and receive ϵ^w. In addition to the non-violation of the two spouses' participation constraints, I impose the condition that for a marriage to be sustained, at least one spouse must devote a strictly positive amount of time to the marriage; either t_m^w or t_m^h must be positive for a marriage to be sustained. One spouse is able to exit the marriage without the consent of the other, and there are no exit costs associating with leaving a marriage. All payoffs and moves are public information in this game. Due to this and the sequential nature of this game, the wife is able take into account the husband's reaction when making her choices.

I solve this game by means of backwards induction for the case of a continuing marriage. First, I solve the husband's maximization problem. The husband's

problem is to maximize $u^h(v, Q, c^h)$ subject to

$$t_m^h + t_c^h = T = 1$$
$$c^h = f(t_c^h, A^h) = A^h t_c^h$$
$$M^h = g(t_m^h, S^h) = S^h t_m^h$$
$$Q = M^w + M^h$$

and to the constraints that both he and his wife choose to remain in the marriage, that is,

$$u^h(v, M^{w*} + M^h, c^h) \geq \overline{u}^h(T, A^h) = u^h(0, 0, f(T, A^h)) \tag{4.1}$$
$$u^w(v, M^{w*} + M^h, c^{w*}) \geq \epsilon^w. \tag{4.2}$$

M^{w*} and c^{w*} are the wife's optimal choices; the husband takes these as given. Solving this, one obtains his first-order conditions for t_m^h and v, respectively,

$$\frac{\partial u^h}{\partial Q} S^h - \frac{\partial u^h}{\partial c^h} A^h + \lambda^h [\frac{\partial u^h}{\partial Q} S^h - \frac{\partial u^h}{\partial c^h} A^h] + \lambda^w \frac{\partial u^w}{\partial Q} S^h \leq 0, \text{ comp. slack } t_m^h \geq 0 \tag{4.3}$$

$$\frac{\partial u^h}{\partial v} + \lambda^h \frac{\partial u^h}{\partial v} + \lambda^w \frac{\partial u^w}{\partial v} \leq 0, \text{ comp. slack } v \geq 0 \tag{4.4}$$

with λ^h being the multiplier on the husband's outside option (4.1) and λ^w being the multiplier on the wife's outside option (4.2). The husband chooses t_m^h to satisfy equation (4.3). If t_m^h is positive, (4.3) holds with equality. The husband chooses v to satisfy equation (4.4). Once again, if v is positive, then (4.4) holds with equality. I divide (4.3) by S^h to arrive at

$$\frac{\partial u^h}{\partial Q} - \frac{\partial u^h}{\partial c^h} A_r^h + \lambda^h [\frac{\partial u^h}{\partial Q} - \frac{\partial u^h}{\partial c^h} A_r^h] + \lambda^w \frac{\partial u^w}{\partial Q} \leq 0 \tag{4.5}$$

where $A_r^h = \dfrac{A^h}{S^h}$ is the husband's comparative advantage in producing his consumption good.

After solving the husband's problem, I then solve the wife's optimization problem taking into account the effect that her own choices have on her husband's choices. In other words, she maximizes taking $v(M^w)$ and $M^h(M^w)$ as given. She maximizes $u_w(v(M^w), Q, c^w)$ subject to

$$t_m^w + t_c^w = T = 1$$
$$c^w = f(t_c^w, A^w) = A^w t_c^w$$
$$M^w = g(t_m^w, S^w) = S^w t_m^w$$
$$Q = M^w + M^h(M^w).$$

Her single first-order condition, with respect to t_m^w, is

$$\frac{\partial u^w}{\partial v}\frac{dv}{dM^w}S^w + \frac{\partial u^w}{\partial Q}S^w + \frac{\partial u^w}{\partial Q}S^h\frac{dt_m^h}{dt_m^w} - \frac{\partial u^w}{\partial c^w}A^w \leq 0, \text{ comp. slack } t_m^w \geq 0 \quad (4.6)$$

which holds with equality if t_m^w is positive. I divide (4.6) by S^w and arrive at

$$\frac{\partial u^w}{\partial v}\frac{dv}{dM^w} + \frac{\partial u^w}{\partial Q} + \frac{\partial u^w}{\partial Q}S_r\frac{dt_m^h}{dt_m^w} - \frac{\partial u^w}{\partial c^w}A_r^w \leq 0. \quad (4.7)$$

This condition depends upon the wife's comparative advantage in producing the consumption good, $A_r^w = \frac{A^w}{S^w}$, and upon her husband's level of sanctification relative to her own level, that is, $S_r = \frac{S_h}{S_w}$. Having presented the model, I next describe the equilibria of the model.

4.3 Determinants of the Likelihood of Domestic Violence

The equilibria of this model can be divided into three sets, one in which the marriage is dissolved, one in which the marriage is sustained and there is no violence, and one in which the marriage is sustained and there is violence. By assumption, either spouse is able to leave the marriage without the consent of the

other. Therefore, it is impossible to have an equilibrium outcome in which one spouse chooses to remain and one chooses to leave. I describe the equilibria in which the marriage is sustained.

Lemma 1. If a marriage is sustained, $\lambda_h = 0$

Proof. By assumption, a necessary condition for a marriage to be sustained is that either M^h or M^w must be strictly greater than 0. Assuming v is 0, Q greater than 0 implies that $u^h(v, Q = M^w + M^h, c^h) > \overline{u}^h(T, A^h) = u^h(0, 0, f(T, A^h))$. If $v > 0$, the lhs is increased even more. □

Lemma 2. Given that $\dfrac{\partial u^h}{\partial v} > 0$ and the couple chooses to remain married, $\lambda^w > 0$.

Proof. If $\lambda^w = 0$ then (4.4) becomes

$$\frac{\partial u^h}{\partial v} \leq 0.$$

□

One should note that the wife's participation constraint (4.2) could bind for two reasons. Assuming a relatively small ϵ^w, the husband would choose a v such that the wife's utility in the marriage is equal to her outside option. It is also possible that the wife's constraint binds because her outside option is sufficiently large.

Lemma 3. There can be no instrumental violence without expressive violence.

The violence in the model can be divided into expressive and instrumental violence. Expressive violence is the violence that would result in the model if the

wife was unable to influence the husband's level of v. The underlying cause of expressive violence is the husband's marginal utility of violence. If this is positive, then expressive violence can be positive; otherwise, it is 0. Instrumental violence is the modification to the level of expressive level that derives from the wife's ability to influence her husband's decision. Instrumental violence exists if $\frac{dv}{dM^w}$ is non-zero. The larger this derivative in absolute value the more impact the wife's actions has on her husband's violence decision. Obviously, if $v = 0$, then $\frac{dv}{dM^w}$ is 0 and the wife cannot influence her husband's decision. Thus, it cannot be the case that $\frac{\partial u^h}{\partial v} \leq 0$ and $\frac{dv}{dM^w} > 0$.

Lemma 4. Given that $\frac{\partial u^h}{\partial v} > 0$ and $\epsilon^w \leq u^w(0, 0, f(T, A^w))$, it cannot be the case that both (1) a marriage is sustained and (2) v = 0.

Proof. Assume that there is a sustained marriage in which $v = 0$. By assumption, M^h or $M^w > 0$. Since $v = 0$, $u^w(0, Q, f(t_c^w, A^w)) > u^w(0, 0, f(T, A^w))$ and $\lambda^w = 0$. From (4.4), $\frac{\partial u^h}{\partial v} \leq 0$. □

Lemma 4 states that for a marriage to be non-violent, the wife's outside option must be larger than her utility from devoting all her time to production of her personal consumption good with no gains from marriage or losses from violence, that is, her utility as a single producer. Thus, this demonstrates that if a relationship is violent, it must be the case that ϵ^w is sufficiently small. A large ϵ^w gives the woman more bargaining power and therefore a buffer against the husband's potential for violence.

Theorem 1. The likelihood of violence is decreasing in ϵ^w.

This follows from Lemma 4 and the fact that when $\epsilon^w > u^w(0, 0, f(T, A^w))$, violence is possible but not a given.

Lemma 5. It is a equilibrium outcome for a wife to remain in an abusive relationship.

This follows from Lemma 4. A wife remains in an abusive relationship under fairly general conditions. As long as she is being compensated in the marriage for the abuse she is suffering, she has no reason to leave the relationship. Even more interesting is that she could be compensating herself. If her comparative advantage in producing the marital good is sufficiently large but her husband's is not, it could be the case that $M^w > 0$ and $M^h = 0$. Thus, $u^w(0, M^w, f(t_c^w, A^w)) > u^w(0, 0, f(T, A^w))$. Then, her husband could choose v to make this constraint bind, and the wife would still choose to remain in the violent relationship.

Lemma 6. If a marriage is sustained and there is no violence, $t_m^h > 0$ and $t_m^w = 0$.

Proof. From Lemma 3, $\dfrac{dv}{dM^w} = 0$. By totally differentiating (4.4), it can be shown that $\dfrac{dt_m^h}{dt_m^w} = -\dfrac{1}{S_r}$. Thus, (4.7) becomes

$$-\frac{\partial u^w}{\partial c^w} A^w \leq 0.$$

The wife devotes none of her time to the marriage and all of her time to the production of her personal consumption good. If the marriage is sustained, it must be the case that $M^h > 0$; therefore, $t_m^h > 0$. □

Theorem 2. The likelihood of domestic violence is increasing in S^h, S^w, and A^w and is decreasing in A^h.

Proof. If the optimal Q^* and t^{w*} are such that $u^w(0, Q^*, A^w t_m^{w*}) < \epsilon^w$, then the marriage cannot be sustained. This is true because the wife's participation constraint is violated. If $u^w(0, Q^*, A^w t_m^{w*}) = \epsilon^w$, then the marriage is sustained and $v = 0$. If $u^w(0, Q^*, A^w t_m^{w*}) > \epsilon^w$, then the marriage is sustained and $v > 0$. These two statements follow from the optimality conditions and the fact that there needs to be slack in the wife's constraint for the husband to choose a positive amount of violence. Thus any parameter change that leads to an increase in the optimal Q^* or t^{w*} (and thus to an increase in $u^w(\cdot)$) increases the likelihood of violence. □

4.4 Determinants of the Level of Domestic Violence

I now examine the determinants of the level of domestic violence in the model. The last section demonstrated that the *likelihood* of domestic violence is increasing S^h, S^w, and A^w and it is decreasing in A^h and ϵ^w. In this section, I assume that violence occurs and show what determines the amount of violence chosen by the husband. There are three specific cases in the model when violence occurs in a relationship. These cases are: (1) $M^w > 0$ and $M^h = 0$, (2) $M^w = 0$ and $M^h > 0$, and (3) $M^w > 0$ and $M^h > 0$. The most reasonable case of the three is case 3. This is due to the fact that even in the worst of relationships each partner most likely devotes some strictly positive amount of time to the relationship.

Thus, the relationship I examine has strictly positive amounts of v, M^w, and M^h. Due to this fact, the husband's two first-order conditions and the wife's single first-order condition hold with equality. Also, recall that when the spouses

choose to remain in a violent marriage, $\lambda^h = 0$ and $\lambda^w > 0$. Thus, the first-order conditions for this specific type of relationship are

$$\frac{\partial u^h}{\partial v} + \lambda^w \frac{\partial u^w}{\partial v} = 0 \tag{4.8}$$

$$\frac{\partial u^h}{\partial Q} + \lambda^w \frac{\partial u^w}{\partial Q} = \frac{\partial u^h}{\partial c^h} A_r^h \tag{4.9}$$

$$\frac{\partial u^w}{\partial v}\frac{dv}{dM^w} + \frac{\partial u^w}{\partial Q} + \frac{\partial u^w}{\partial Q} S_r \frac{dt_m^h}{dt_m^w} = \frac{\partial u^w}{\partial c^w} A_r^w. \tag{4.10}$$

These are the conditions for v, t_m^h, and t_m^w, respectively. Solving (4.8) for λ^w,

$$\lambda^w = -\frac{\frac{\partial u^h}{\partial v}}{\frac{\partial u^w}{\partial v}}. \tag{4.11}$$

λ^w is the shadow price of an additional unit of his wife's utility in the eyes of the husband. This can thought of as the price of violence. λ^w determines the maximal amount the husband would pay to purchase more utility for his wife so that he could increase v and still keep his wife's utility large enough so that she remains in the marriage. One can then substitute (4.11) into (4.9) to get

$$\frac{\partial u^w}{\partial v}\frac{\partial u^h}{\partial Q} - \frac{\partial u^h}{\partial v}\frac{\partial u^w}{\partial Q} = \frac{\partial u^w}{\partial v}\frac{\partial u^h}{\partial c^h} A_r^h. \tag{4.12}$$

To derive specific predictions from the model, I assume that $u^h(v, Q, c^h) = (1 + v^{\alpha^h})Q^\beta + c^h$ and that $u^w(v, Q, c^w) = (1 - v^{\alpha^w})Q^\beta + c^w$ with $\alpha^h \in (0, 1)$, $\alpha^w \in (1, \infty)$, and $\beta \in (0, 1)$. Substituting these specific functions into the above first-order conditions, one finds that

$$\frac{v^{2\alpha^w - \alpha^h}}{1 - v^{\alpha^w}} = \frac{\alpha^h(\alpha^w - \alpha^h)\beta}{\alpha^w \alpha^w (1 - \beta)} \frac{A^w S^h}{S^w A^h}. \tag{4.13}$$

The first thing to note from this equation is that the relative productivity, $\dfrac{A^h}{A^w}$, and the relative level of sanctification, $\dfrac{S^h}{S^w}$, are the factors that ultimately dictate the amount of violence in the marriage.

From the above equation, one is able to derive two theoretical predictions, one regarding the spouses' relative productivity and one regarding the spouses' relative level of sanctification. Note that the left-hand side of equation (4.13) is increasing in v. Thus, with regard to the relative productivity level of the two spouses, one finds that as the husband (or the abuser) becomes more productive in making the personal consumption good relative to his wife (or the abused), v decreases. That is,

$$\frac{\partial v}{\partial\{\frac{A^h}{A^w}\}} < 0.$$

This occurs because the husband would prefer to spend more of his scarce time in producing his personal consumption good and less in producing the marital good. To compensate for the time that the husband is not spending in producing the marital good, he motivates his wife to produce more of the marital good by offering a less violent relationship.

With regard to the relative level of sanctification of the spouses, I find that as the husband (or the abuser) increases his level of sanctification relative to his wife (or the abused), v increases. That is,

$$\frac{\partial v}{\partial\{\frac{S^h}{S^w}\}} > 0.$$

In this situation, the husband prefers to devote his time to the marriage rather than to the production of the consumption good. Due to this, he does not need to use violence as a motivating factor and can increase v.

4.5 Empirical Implications

To test my theoretical predictions, I use the National Survey of Families and Households (NSFH), Wave 1. The NSFH-1 is a national survey conducted in

1987-88 by researchers at the University of Wisconsin, Madison. These researchers oversampled certain segments of the population, for example, African-Americans and Puerto Ricans. This survey contains data on both primary respondents and their spouses or partners. Primary respondents completed an in-person interview and a self-administered questionnaire. The spouse or partner only completed a self-administered questionnaire. In the following analysis, all data are weighted to account for oversampling and differential response rates to the questionnaires. In my analysis, I focus on primary respondents who are currently married and living with their spouse. Additionally, I require that the spouse completed the relevant questionnaire.

The NSFH-1 collected data on the incidence of domestic violence, religious behavior, and other socioecononomic characteristics of both the primary respondent and spouse. From these data, I construct a domestic violence indicator that takes on the value 1 if the husband has engaged in domestic abuse in the last year; it is 0 otherwise.[1] I focus on male-perpetrated domestic abuse because it is generally believed that female-perpetrated violence is more defensive in nature. In the following regressions, this indicator is the dependent variable.

I construct two indices that measure a spouse's level of sanctification. To construct the first, I assume that religious involvement as measured by church attendance and one's level of sanctification are highly and positively correlated. Thus, I use church attendance as a proxy for sanctification. I construct an index for both the husband and wife that takes on four values, 0 if the spouse attends less than once a year, 1 if the spouse attends several times per year, 2 if the

[1]My empirical work closely follows that of Ellison et al.[9], including both the indices that I construct and the regressions I run. My work is largely a replication of theirs.

spouse attends 1 to 3 times per month, and 3 if the spouse attends at least once per week. I use these indices for two purposes. First, from the two indices I create a set of three indicators for each spouse that correspond to the index values of 1, 2, and 3. Second, I subtract the female attendance index from the male attendance index; this difference takes on values from 3 to -3. From this difference I create four indicators that measure relative church attendance between spouses. If this difference is ≥ 2, I say that the "man attends much more"; if it is = 1, the "man attends somewhat more"; if it is = -1, the "woman attends somewhat more"; and if it is ≤ -2, the "woman attends much more."

To construct the second index, I assume that an individual's theological conservatism is highly and positively correlated with his level of sanctification. I measure an individual's theological conservatism by his agreement to two survey statements, "The Bible is God's word and everything happened or will happen exactly as it says," and "The Bible is the answer to all human problems." The respondent's possible responses vary from (1) strongly disagree to (5) strongly agree. An individual's degree of theological conservatism is measured as his average response to these two statements. I construct such an index for both husband and wife. Once again, I use these indices for two purposes. First, I create three indicators that correspond to the index values of ≥ 4 (conservative), ≥ 2.5 and ≤ 3.5 (moderate), and ≤ 2 (liberal). Second, I measure a couple's relative conservatism by subtracting the woman's index from the man's. I then construct four indicators corresponding to values of this difference. If the difference is ≥ 1.5, the "man is much more conservative"; if it is ≤ 1.5 and ≥ 0, the "man is somewhat more conservative"; if it is ≤ 0 and ≥ -1.5, the "woman is somewhat more conservative"; and if it is ≤ -1.5, the "woman is much more conservative."

I test the effect of both church attendance and theological conservatism

Table 4.1: Descriptive Statistics

	Mean	Std. Dev.	Min.	Max.
Domestic Violence	.045	.208	0	1
Male Attendance				
Several times per year	.174	.379	0	1
1-3 times per month	.162	.369	0	1
At least once per week	.302	.459	0	1
Female Attendance				
Several times per year	.159	.365	0	1
1-3 times per month	.167	.373	0	1
At least once per week	.394	.489	0	1
Couple's attendance dissimilarity				
Man attends much more	.025	.157	0	1
Man attends somewhat more	.085	.279	0	1
Woman attends somewhat more	.167	.373	0	1
Woman attends much more	.105	.307	0	1
Male Theological Conservatism				
Liberal	.363	.481	0	1
Moderate	.454	.498	0	1
Conservative	.182	.386	0	1
Female Theological Conservatism				
Liberal	.427	.495	0	1
Moderate	.433	.496	0	1
Conservative	.139	.346	0	1
Couple's theological dissimilarity				
Man much more conservative	.022	.148	0	1
Man somewhat more conservative	.236	.424	0	1
Woman somewhat more conservative	.146	.353	0	1
Woman much more conservative	.014	.116	0	1
Covariates				
Personal income	30773.57	41485.36	0	800000
Woman's earning share	.282	.245	0	1
Education	12.95	3.13	0	20
Educational difference	.109	2.61	-15	14
African-American	.084	.278	0	1
Hispanic	.066	.249	0	1
Age	41.9	14.6	17	89
Unemployed	.697	.460	0	1

on the likelihood of domestic violence by means of a logit regression. My results are presented in Table 4.2. "Personal income" is the income (this includes all sources of income save investments) of the husband. "Woman's earning share" is the woman's income divided by the couple's total income. "Education" is the educational attainment of the husband in years, and "Educational difference" is the husband's educational attainment less the wife's. "African-American" is an indicator that is 1 if the husband is African-American, and "Hispanic" is an indicator that is 1 if the husband is Hispanic. "Age" is the age of the husband in years. Finally, "Unemployed" is an indicator that is 1 if either spouse was unemployed and looking for work in the previous year. I consider both the income and education variables as proxies for the productivity parameters in the model.

The descriptive statistics for the indices and other covariates are listed in Table 4.1. Only 4.5 percent of couples in the sample reported at least one incident of domestic violence in the last year. Also, of this percentage, the vast majority of respondents report exactly one incident. Examining the "Male Attendance" variables, one sees that if a man does attend services, he most likely attends on a weekly basis. 30.2 percent of males attend church on a weekly basis, 16.2 percent 1 to 3 times per month and 17.4 percent several times per year. The same observation holds for women. Additionally, women are more likely to attend on a weekly basis than men, 39.4 percent of the sample versus 30.2. This agrees with the fact that the female attends services more than the male in 27.2 percent of couples; the male attends more than the female in only 11 percent of couples

Turning now to the "Theological Conservatism" variables, one sees that a man is more likely to be conservative than a female (18.2 percent versus 13.9), about equally likely to be moderate (45.4 percent versus 43.3), and less likely to be liberal (36.3 percent versus 42.7). In contrast to attendance dissimilarity, 25.8

Table 4.2: Main Estimation Results

	Dependent variable: Domestic Violence Indicator		
	(1)	(2)	(3)
Male Attendance			
Several times per year	-	-.160 (.852)	-
1-3 times per month	-	-.331 (.718)	-
At least once per week	-	-1.15 (.317)**	-
Female Attendance			
Several times per year	-	-.108 (.898)	-
1-3 times per month	-	-.151 (.860)	-
At least once per week	-	.157 (1.17)	-
Male Theological Conservatism			
Moderate	-	-	.940 (1.10)
Conservative	-	-	.635 (1.89)**
Female Theological Conservatism			
Moderate	-	-	-.514 (.598)*
Conservative	-	-	-.002(.998)
Covariates			
Personal income	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)
Woman's earning share	.309 (1.36)	.224 (1.25)	.251 (1.29)
Education	-.127 (.881)**	-.105 (.900)*	-.152 (.859)***
Educational difference	.051 (1.05)	.042 (1.04)	.056 (1.06)
African-American	1.11 (3.03)***	1.18 (3.24)***	1.12 (3.05)***
Hispanic	-.568 (.567)	-.440 (.644)	-.626 (.535)
Age	-.078 (.925)***	-.074 (.928)***	-.081 (.922)***
Unemployed	-.437 (.646)*	-.411 (.663)*	-.427 (.652)*
Pseudo R^2	.100	.116	.111

Notes: In the above logit regressions, the male is always the perpetrator of domestic violence. Unless otherwise noted, the covariates refer to characteristics of the male spouse. The data are from the National Survey of Families and Households, Wave 1. Each entry is a logit regression coefficient. The respective odds ratios are reported in parentheses. ***significant at the 1% level. **significant at the 5% level. *significant at the 10% level.

percent of couples consist of a male who is more conservative than his spouse; whereas, only 16 percent consist of a female who is the more conservative spouse. Rarely is it the case, though, that one spouse is much more conservative theologically than the other; this occurs in 3.6 percent of couples. Additionally, the woman typically earns about 28 percent of the couple's total income, though she is on average as well educated as her husband. The average difference in education between husband and wife is .109 years. Given that the mean age of the sample is 41.9 years, it is surprising that nearly 70 percent of couples report having at least one spouse unemployed and looking for work in the previous year.

My main interest lies in regressions (2) and (3) in Table 4.2. Recall that the model predicts that the likelihood of violence increases in the level of sanctification of both the husband and wife when productivity is controlled for. In regression (2), the only attendance coefficient that is significant is the coefficient on "At least once per week" for the male; but it is negative. In regression (3), if the male is theologically conservative, the likelihood of violence is increased; but if the female is theologically moderate, the likelihood of violence is decreased. Perhaps, a moderate partner is more amenable to her spouse's beliefs and therefore less likely to engage in an argument over religious belief; whereas, a conservative partner holds firmly to his beliefs and is willing to fight when these beliefs are challenged.

One can see that across both of these regressions the coefficient on "Education" is negative and significant. This is in accord with the theoretical predictions. The model also predicts the wife's educational level would increase the likelihood of violence. I substituted the wife's years of schooling for "Educational difference" and her personal income for "Woman's earning share", but neither of these variables explained the likelihood of violence. "African-American" and "Age" are

Table 4.3: Additional Estimation Results

	Dependent variable: Domestic Violence Indicator		
	(1)	(2)	(3)
Couple's attendance dissimilarity			
Man attends much more	-	.560 (1.75)	-
Man attends somewhat more	-	.120 (1.13)	-
Woman attends somewhat more	-	.170 (1.18)	-
Woman attends much more	-	.538 (1.71)*	-
Couple's theological dissimilarity			
Man much more conservative	-	-	.873 (2.39)
Man somewhat more conservative	-	-	.427 (1.53)*
Woman somewhat more conservative	-	-	.199 (1.22)
Woman much more conservative	-	-	.823 (1.09)
Covariates			
Personal income	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)
Woman's earning share	.309 (1.36)	.319 (1.38)	.308 (1.36)
Education	-.127 (.881)**	-.123 (.884)**	-.137 (.872)**
Educational difference	.051 (1.05)	.051 (1.05)	.054 (1.06)
African-American	1.11 (3.03)***	1.05 (2.87)***	1.17 (3.22)***
Hispanic	-.568 (.567)	-.555 (.574)	-.558 (.573)
Age	-.078 (.925)***	-.078 (.925)***	-.078 (.923)***
Unemployed	-.437 (.646)*	-.416 (.660)*	-.426 (.653)*
Pseudo R^2	.100	.104	.105

Notes: see Table 4.2.

always highly significant. The coefficient on "Unemployed" is negative and significant at the 10 percent level. This is odd as one would expect this coefficient to be positive and increase the likelihood of domestic violence; in fact, Ellison and his co-authors find this coefficient to be positive and significant. The results only partially match my theoretical predictions. In regard to sanctification, the results depend on what proxy is chosen for sanctification, and in regard to productivity, only the male's education seems to matter.

I am unable to test the theoretical predictions regarding the level of domestic violence in a relationship. This is due to the fact that so very few of the couples

that report that violence has occurred report more than one incident. Instead, I examine whether the relative values of sanctification and productivity affect the likelihood of domestic violence since I do have a sufficient amount of data for these regressions. My results are presented in Table 4.3. Once again, one can see that my results depend upon which proxy for sanctification I choose. In regression (2), if the woman attends service much more than the man, the likelihood of violence increases; and if the man is somewhat more conservative theologically than the woman the likelihood of violence is increased. The remaining covariates behave as in the previous regressions in Table 4.2.

4.6 Conclusion

In the sociology literature, the connection between religious involvement and the incidence of domestic violence has been demonstrated, but both the pathway linking religious involvement and domestic violence and a formal model of that pathway has yet to be provided. In this essay, I attempt to remedy that deficiency by proposing sanctification as the pathway and by constructing a theoretical model causally connecting religious involvement and the incidence of domestic violence through this pathway.

In my theory, an agent must allocate a fixed amount of time between producing a personal consumption good and a marital good. Sanctification increases an agent's return to investing time in his marriage. Therefore, as an agent's level of sanctification increases, his incentive to invest time in his marriage increases. Additionally, the husband chooses a level of domestic violence in which to engage. Due to the sequential nature of the model, the husband's violence decision is influenced by both his own and his wife's idiosyncratic levels of sanctification and

productivity.

The data partially match my theoretical predictions. With regard to sanctification, the data partially match my results if I choose theological belief as a proxy for sanctification, but not if I choose church attendance as the proxy. Thus, a future project would examine in more detail the definition of sanctification and what proxies most exactly capture that concept. With regard to productivity (in making the personal consumption good), the data show that as the husband's years of schooling increase, the likelihood of violence decreases, but the wife's years of schooling have no effect.

Potentially fruitful modifications of the model include explicitly modeling the wife's outside option to depend upon parameters such as her own productivity, the psychological effect that violence has upon the abused, her wealth, or her social network. A useful addition would be a legal cost or social stigma that is incurred by the abusive partner. Additionally, it would be interesting to investigate how sanctification affects domestic behavior in other dimensions beside violence. Future research will include these modifications and attempt to bridge the gap between data and theory.

Chapter 5

Conclusion

My goal in this dissertation has been to model domestic behavior as dependent upon personal religious beliefs and religious norms with the aim of more fully specifying an individual's motivation for action and more accurately predicting his behavior. To accomplish this goal, I construct two original models, one describing a single agent's marital decision and one describing a potentially abusive marriage. In the former model, I incorporate a religious norm into the agent's marital decision by modeling marriage as a set of two contracts, one civil and one religious, and by having the benefits and costs of the religious contract be dependent upon aggregate social belief in the religious institution of marriage. In the latter model, I incorporate an individual agent's religiosity by having his return to investing in his marriage depend positively upon the degree to which he sanctifies his marriage.

In Chapters 2 and 4, I present strong, empirical evidence that an agent's domestic behavior depends upon his religious beliefs and responds to changes in religious norms and institutions. In Chapter 2, I demonstrate that the divergence that is seen between the civil and Catholic marriage rates is due largely to changes in the Catholic institution of marriage and not to changes in the civil institution of marriage, and, following in Chapter 3, I demonstrate that the absolute movement of these rates is also largely a response to changes in the structure of Catholic marriage. In Chapter 4, I show that the likelihood of domestic violence in a marriage in which the two spouses are currently cohabiting is influenced by the strength

of religious belief of each of the spouses. The evidence presented in Chapter 4 is largely a replication of the ongoing work of Ellison and his co-authors[9, 10]. Given these observations, it seems necessary to build theoretical models of domestic behavior that include religiosity and religious norms, but these models for the most part have yet to be constructed. Specifically, with regard to marital behavior and to the incidence of domestic violence, these models do not exist.

In Chapter 3, I construct and analyze a search model that describes the marital decision of a single agent who must choose to marry civilly, marry civilly and religiously, or to remain single. This model predicts that the reform of civil divorce law will not affect either the civil or religious marital behavior of single agents. It also predicts that the reform of the religious institution of marriage as seen in the US in the 1960s will decrease the religious marriage rate, increase the interfaith marriage rate, and increase the civil marriage rate. In Chapter 4, I construct and analyze a model that describes the violence decision made by a potentially abusive husband and the time allocation decisions of both husband and wife. The model predicts that the likelihood of violence will increase in the idiosyncratic religiosities and decrease in the idiosyncratic productivities of both the husband and wife. It also predicts that if violence occurs, the level of violence in the relationship is determined by the *relative* values of religiosity and productivity, that is, the value of the husband's religiosity (or productivity) relative to his wife's. The level of violence increases as the husband becomes more religious as compared to his wife, and it decreases as the husband becomes more productive as compared to his wife.

Given these theoretical predictions, the most salient question to ask is, are these predictions more accurate than those of previous models that do not incorporate religious belief? To some degree these two theories necessarily make more

accurate predictions, in the sense that they actually make predictions regarding religiosity and its effect on behavior, whereas previous models have nothing to say regarding religiosity and its effects. In addition to this, the theoretical predictions of my marriage model match the empirical implications of the data with reference to all three marriage rates. So this model is a significant improvement over previous models, since it matches not only the movements of secular variables but also religious variables. The theoretical predictions of my domestic violence model regarding productivity match the data fairly well, but the predictions regarding religiosity only partially match the data. These mixed results could be due to the vagueness of the definition of sanctification, or religiosity, and the proxy that I chose for sanctification. Thus, it is generally the case that the predictions of these models improve upon those of existing models since they match the empirical implications with reference to secular variables and generally do a good job of matching the empirical implications with reference to religious variables.

In my future research, I would like to expand the scope of the work conducted in this dissertation. I hope to do this in two ways. First of all, I would like to continue to study the two models presented here and modify them so as to understand more fully the discrepancies between the theory and data. Secondly, I would like to incorporate religiosity and religious complementarities more widely in models of domestic behavior because as of now these elements are conspicuously missing throughout the economics literature.

Bibliography

[1] Akerlof, George A. (2007) "The Missing Motivation in Macroeconomics", *American Economic Association Presidential Address*, Chicago, IL.

[2] Akerlof, George A. (1980) "A Theory of Social Custom, of Which Unemployment May be One Consequence", *The Quarterly Journal of Economics*, vol. 94, pp. 749-775.

[3] Azzi, Corry and Ronald G. Ehrenberg (1975) "Household Allocation of Time and Church Attendance", *Journal of Political Economy*, vol. 83, pp. 27-56.

[4] Becker, G. S., Elisabeth M. Landes, and Robert T. Michael (1977) "An Economic Analysis of Marital Instability", *Journal of Political Economy*, vol. 85, pp. 1141-1187.

[5] Bernheim, B. Douglas (1994) "A Theory of Conformity", *The Journal of Political Economy*, vol. 102, pp.841-877.

[6] Brinig, Margaret F. and F. H. Buckley (1998) "No-Fault Laws and At-Fault People", *International Review of Law and Economics*, vol. 18, pp. 325-340.

[7] Cunningham, Mick and Arland Thornton (2006) "The Influence of Parents' Marital Quality on Adult Children's Attitudes toward Marriage and its Alternatives: Main and Moderating Effects", *Demography*, vol. 43, pp. 659-672.

[8] Eagly, A. H. and S. Chaikan, *The Psychology of Attitudes* (Fort Worth, TX: Harcourt Brace Jovanovich, 1993).

[9] Ellison, C. G., J. P. Bartowski, and K. L. Anderson (1999) "Are There Religious Variations in Domestic Violence?", *Journal of Family Issues*, vol. 20, pp. 87-113.

[10] Ellison, C. G. and K. L. Anderson (2001) "Religious Involvement and Domestic Violence Among U.S. Couples", *Journal for the Scientific Study of Religion*, vol. 40, pp. 269-286.

[11] Ellman, Ira Mark and Sharon L. Lohr (1998) "Dissolving the Relationship Between Divorce Laws and Divorce Rates", *International Review of Law and Economics*, vol. 18, pp. 341-359.

[12] Farmer, A. and J. Tiefenthaler (1997) "An Economic Analysis of Domestic Violence", *Review of Social Economy*, vol. LV, pp. 337-358.

[13] Finke, Roger and Rodney Stark (1988) "Religious Economies and Sacred Canopies: Religious Mobilization in American Cities, 1906", *American Sociological Review*, vol. 53, pp. 41-49.

[14] Fergusson, D. M., L. J. Horwood, K. L. Kershaw, and F. T. Shannon (1986) "Factors Associated with Reports of Wife Assault in New Zealand", *Journal of Marriage and the Family*, vol. 48, pp. 407-412.

[15] Friedberg, Leora (1998) "Did Unilateral Divorce Raise Divorce Rates? Evidence from Panel Data", *American Economic Review*, vol. 88, pp. 608-627.

[16] Gelles, R., *The Violent Home: A Study of Physical Aggression Between Husbands and Wives* (Beverly Hills: Sage Publications, 1974).

[17] Gray, Mark, Paul Perl, and Tricia Bruce (2007) *Marriage in the Catholic Church: A Survey of US Catholics.* Georgetown University, Center for Applied Research in the Apostolate.

[18] Gregoire, Scott (2008) "The Divergence of Civil and Catholic Marital Behavior in the United States", The University of Texas at Austin, Ph.D. dissertation.

[19] Gruber, Jonathan (2004) "Is Making Divorce Easier Bad for Children? The Long-Run Implications of Unilateral Divorce", *Journal of Labor Economics*, vol. 22, pp. 799-833.

[20] Hout, M. and A. Greeley (1987) "The Center Doesn't Hold: Church Attendance in the United States 1940-1984", *American Sociological Review*, vol. 52, pp. 325-345.

[21] Iannaccone, Laurence R. (1990) "Religious Practice: A Human Capital Approach", *Journal for the Scientific Study of Religion*, vol. 29, pp. 297-314.

[22] Iannaccone, Laurence R. (1992) "Sacrifice and Stigma: Reducing Free-Riding in Cults, Communes, and Other Collectives", *Journal of Political Economy*, vol. 100, pp. 271-297.

[23] Kalmijn, Matthijs (1991) "Shifting Boundaries: Trends in Religious and Educational Homogamy", *American Sociological Review*, vol. 56, pp. 786-800.

[24] Mahoney, A., K. I. Pargament, T. Jewell, A. B. Swank, E. Scott, E. Emery, and M. Rye (1999) "Marriage and the Spiritual Realm: The Role of Proximal and Distal Religious Constructs in Marital Functioning", *Journal of Family Psychology*, vol. 13, pp. 321-328.

[25] Mahoney, A., K. I. Pargament, A. Murray-Swank, and N. Murray-Swank (2003) "Religion and the Sanctification of Family Relationships", *Review of Religious Research*, vol. 44, pp. 220-236.

[26] Manstead, Tony and Miles Hewstone, Eds. (1996) *The Blackwell Encyclopedia of Social Psychology.* Oxford, UK: Blackwell Publishing.

[27] Matouschek, Nino and Imran Rasul. "The Economics of the Marriage Contract: Theories and Evidence", forthcoming, *Journal of Law and Economics.*

[28] McCutcheon, Allen (1988) "Denominations and Religious Intermarriage: Trends among White Americans in the Twentieth Century", *Review of Religious Research*, pp. 213-227.

[29] Nakonezny, Paul A., Robert D. Shull and Joseph Lee Rodgers (1995) "The Effect of No-Fault Divorce on the Divorce Rate Across the 50 States and Its Relation to Income, Education, and Religiosity", *Journal of Marriage and the Family*, vol.57, pp. 477-488.

[30] National Center for Health Statistics. *Monthly Vital Statistics Report*, 1960-1993. Washington DC: US Government Printing Office.

[31] *Official Catholic Directory*, 1960-1993. Providence, NJ: PJ Kennedy & Sons.

[32] Pollak, R. A. (2002) "An Intergenerational Model of Domestic Violence", unpublished manuscript, Washington University in St. Louis.

[33] Rasul, Imran (2005) "The Impact of Divorce Laws on Marriage", University of Chicage, mimeo.

[34] Sherkat, Darren (2004) "Religious Intermarriage in the United States: Trends, Patterns, and Predictors", *Social Science Research*, vol. 33, pp. 606-625.

[35] Sherkat, Darren and Christopher Ellison (1999) "Recent Developments and Current Controversies in the Sociology of Religion", *Annual Review of Sociology*, vol 25., pp. 363-394.

[36] Staats, A. W. (1983) "Paradigmatic Behaviorism: Unified Theory for Social-Personality Psychology" in L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 16, pp 125-79).

[37] Staats, A. W. and C. K. Staats (1958) "Attitudes Established by Classical Conditioning", *Journal of Abnormal and Social Psychology*, vol. 57, pp. 37-40.

[38] Stark, Rodney, *The Rise of Christianity: How the Obsure, Marginal Jesus Movement Became the Dominant Religious Force in the Western World in a Few Centuries* (Princeton, NJ: Princeton University Press 1996).

[39] Tauchen, H. V., A. D. Witte, and S. K. Long (1991) "Domestic Violence: A Nonrandom Affair", *International Economic Review*, vol. 32, pp. 491-511.

[40] Wilde, Melissa (2001) "From Excommunication to Nullification", *Journal for the Scientific Study of Religion*, vol. 40, pp. 235-249.

[41] Wolfers, Justin (2006) "Did Unilateral Divorce Laws Raise Divorce Rates? A Reconciliation and Results", *American Economic Review*, vol. 96, pp. 1802-1820.

Vita

Scott Larkin Gregoire was born in Metairie, Louisiana on January 12, 1981, the son of Larkin Andrew Gregoire and Antoinette Colon Gregoire. After graduating as valedictorian of his class from Jesuit High School in New Orleans, Louisiana, in 1999, he entered Tulane University also in New Orleans, Louisiana. He received the degree of Bachelor of Science from Tulane University in May 2003. During the following year, he was employed as an Economist at the Bureau of Economic Analysis in Washington, D.C. In August 2004 he began his graduate studies in Economics at the University of Texas. He was awarded a Harrington Fellowship for his first year of graduate study. He earned the degree of Master of Science from the University of Texas in December 2006. In the summer of 2008, he was awarded a Hale Fellowship by the Economics Department at the University of Texas.

Permanent address: 10301 Ranch Road 2222, Austin, TX 78730

This dissertation was typeset with LaTeX[†] by the author.

[†]LaTeX is a document preparation system developed by Leslie Lamport as a special version of Donald Knuth's TeX Program.